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# THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME II

NEW YORK
DODD, MEAD AND COMPANY
1928

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Printed in the U. S. A.

Reference

Vail-Ballou Press, Inc., Binghamton, N. Y.
J. F. Tapley Co., Long Island City, N. Y.

# ILLUSTRATIONS IN VOLUME II.

## COLORED PLATES


FACING PAGE

ARCHITECTURE, EGYPTIAN — Temple of Karnak (from the restored model) . . . . 58
ARCHITECTURE, GREEK — The Parthenon (from the restored model) . . . . . 60
ASIA — Yellow Races . . . . . 242
AZALEAS AND RHODODENDRONS . . . . . 464
BASKETS, INDIAN . . . . . 744


## MAPS


ARCTIC REGIONS . . . . . 70
ARGENTINE REPUBLIC . . . . . 84
ARIZONA . . . . . 116
ARKANSAS . . . . . 124
ASIA, Physical Map . . . . . 238
ASIA . . . . . 240
ASIA, CENTRAL . . . . . 244
AUSTRALASIA . . . . . 390
AUSTRIA-HUNGARY . . . . . 410
BALKAN PENINSULA . . . . . 568
BAVARIA — German Empire . . . . . 784


## ENGRAVINGS


ARAUCARIA . . . . . 14
ARCHES . . . . . 24
ARCHÆOLOGY, MYCENÆAN AND EARLY GREEK . . . . . 30
ARCHÆOLOGY, MYCENÆAN AND EARLY GREEK . . . . . 31
ARCHÆOLOGY, AMERICAN . . . . . 42
ARCHÆOLOGY, AMERICAN, Aboriginal Modeling and Maya Sculpture . . . . . 43
ARCHITECTURE, An American Tower Building . . . . . 64
ARCHITECTURE, MEXICAN — Temple of Palenque; Restoration . . . . . 66
ARMOR, EUROPEAN . . . . . 150
ARMY WORM AND AMBROSIA BEETLES . . . . . 162
ARTILLERY, Historical Weapons . . . . . 208
ASCIDIANS AND BALANOGLOSSUS . . . . . 224
ASH AND ARAUCARIA . . . . . 230
ASSYRIAN ARCHITECTURE — Palace of Sargon; Restoration . . . . . 280
ATHENS, Restorations . . . . . 312
ATHLETICS . . . . . 316
[illegible] . . . . . 376

FACING PAGE

AUSTRALIAN ABORIGINES . . . . . 402
AUTOMOBILES . . . . . 434
AXOLOTL AND AYE-AYE . . . . . 458
BAALBEK . . . . . 472
BABOONS . . . . . 478
BACON, FRANCIS, Lord Verulam . . . . . 504
BALSAM, etc. . . . . 594
BAMBINO . . . . . 606
BAMBOO, etc. . . . . 608
BARNS . . . . . 684
BARNACLES . . . . . 688
BASS, AMERICAN FRESH-WATER . . . . . 748
BATS . . . . . 756

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# KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā as in ale, fate.
ȧ " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
ȧ " " ant, and final *a* in America, armada, etc.
*a* " " final, regal, pleasant.
ą " " all, fall.
ē " " eve.
ę̄ " " elate, evade.
ĕ " " end, pet.
ẽ " " fern, her, and as *i* in sir, etc.
*e* " " agency, judgment.
ī " " ice, quiet.
i̇ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȯ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
*o* " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
ŭ " " unite.
ŭ " " cut, but.
u̇ " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̄ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz'm (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

# A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME II.


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# THE NEW INTERNATIONAL ENCYCLOPÆDIA

**AR'ABIN.** The chief constituent of gum-arabic, obtained by precipitating an acidulated aqueous solution of gum-arabic with ordinary alcohol.

**ARABI PASHA,** ȧ-rä'bē pȧ-shä', properly AHMED ARABI (c.1841–1911). Leader of the national party in Egypt in 1882. He was born of fellah parents in lower Egypt, and his early youth was spent as a laborer. He served for 12 years as a private soldier in the Egyptian army and gradually rose to the rank of colonel. He took advantage of the discontent which prevailed in Egypt on account of the foreign influence to organize a rebellion on the issue of "Egypt for the Egyptians." The lack of energy shown by the Khedive Tewfik permitted Arabi to acquire great influence. He participated in the revolt against Nubar Pasha, obtained the removal of the ministry, and entered the new cabinet as Minister of War (1882). In this position he became a virtual autocrat, setting aside the Anglo-French financial control. England now intervened, and a war ensued. On July 11–12, 1882, an English fleet bombarded Alexandria. Arabi withdrew, and the British undertook a vigorous campaign against him, completely defeating him Sept. 13, 1882, at Tel-el-Kebir. He surrendered the following day, and a sentence of death was passed upon him, but it was commuted to life exile in Ceylon. The movement he had headed collapsed, and its only result was the permanent establishment of British control in Egypt. He was pardoned by the British government, returning to Egypt in 1901. His death occurred on Sept. 21, 1911. Consult: Long, *The Three Prophets—Chinese Gordon, Mohammed Ahmed (el Mahdi), Arabi Pasha* (New York, 1884); Broadley, *How we Defeated Arabi and his Friends* (London, 1884). See EGYPT.

**ARABKIR,** ä'rȧb-kēr', or **ARABGIR.** A town of Asiatic Turkey, about 170 miles northwest of Diarbekr (Map: Turkey in Asia, H 3). It lies on the route from Aleppo to Trebizond and is of considerable commercial importance. Cloth is manufactured and fruit, grown in the vicinity, is exported. The population is estimated to be between 20,000 and 30,000. This includes a considerable number of Armenians, who have been subject to frequent persecution. There was a severe massacre in 1895.

**AR'ABY.** A poetical form, especially current in the Renaissance, for Arabia.

**ARACAJU,** ȧ-rä'kȧ-zhōō'. The chief port, and since 1855 the capital of the Brazilian state of Sergipe, situated about 7 miles from the coast on the river Cotindiba, which furnishes good anchorage to ships of less than 12 feet draught (Map: Brazil, K 6). The city is regularly built and contains an agricultural school. Hides and sugar are exported. It is connected by rail with Capella and Signão Diaz in the interior, and has an estimated population of 6000, including Indians.

**AR'ACAN'.** See ARAKAN.

**ARACARI,** ȧ-rä'kȧ-rē' (Portug.). A toucan of the genus *Pteroglossus*. See TOUCAN.

**ARACATÍ,** ȧ'rȧ-cȧ-tē'. A city in the state of Ceará, Brazil, on the river Jaguaribe, 10 miles from its mouth, and 75 miles southeast of Ceará (Map: Brazil, K 4). Its harbor is shallow, with a shifting bar at the entrance, but can be entered at high tide. Its exports are cattle, hides, cotton, and sugar. It maintains regular steamship communication with Pernambuco and has a population of about 10,000. It was founded in 1723.

**ARA'CEÆ.** See ARUM.

**ARACHIS,** ăr'ȧ-kĭs. See PEANUT.

**ARACHNE,** ȧ-răk'nē (Gk. *'Αράχνη, arachnē*, lit. spider). The mythical Lydian girl who ventured to challenge Athene to a contest in weaving. The goddess, angered at finding no flaw in the girl's work, changed her into a spider. Her fate, and especially her skill with the shuttle and the loom, have been a favorite theme among the poets.

**ARACH'NIDA** (Gk. *ἀράχνη, arachnē*, a spider). A class of air-breathing arthropods including the mites, scorpions, spiders, and a few other less well-known groups. The typical Arachnida have the head and the thorax more or less fused into a "cephalothorax," four pairs of legs, and no antennæ, the maxillary palps functioning as antennæ. The eyes are all simple and vary in number from 2 to 12. By the number and arrangement of these eyes the species of spiders are determined. The abdomen possesses no true legs, but the three abdominal spinnerets of spiders are homologous with legs. Besides the spinneret glands in the abdominal region of spiders there are poison glands in the last abdominal segment of scorpions, located at the base of the sting. In other forms the poison is emitted through the hollow jaws. The Arachnida breathe by means of tracheæ, like other insects,

or by means of sacklike bodies called "lungs" that open on the under side of the abdomen; but some forms breathe by both tracheæ and lungs. All the Arachnida are carnivorous save some of the mites, which live on plant sap. Most of the animal feeders prey upon other insects and hence are the friends of agriculture. A few forms are parasitic on warm-blooded vertebrates and fish and cause or accompany such diseases as itch and mange. The history of this class goes back to Palæozoic times.

*Classification.*—The Arachnida are divided into seven or more orders: (1) Solpugida, or wind scorpions; (2) Scorpionidea, or scorpions; (3) Pseudoscorpionidea, or Chernetidea, book scorpions; (4) Pedipalpi, or whip scorpions; (5) Phalangidea, or harvest men; (6) Araneæ, or spiders; and (7) Acarina, or mites. The following groups are believed by many to fall into the class Arachnida, but their relationships are doubtful: Linguatulida, or tongue parasites of the dog; Tardigrada, or water bears; Pycnogonida, or sea spiders; Xiphosura, or king crabs. See MITES; SCORPIONS; SPIDERS; HARVEST MAN.

**ARACH'NOID MEM'BRANE** (Gk. ἀραχνοειδής, *arachnoeidēs*, like a spider's web). One of the three coverings of the brain and spinal cord. It is a thin, glistening membrane, which lies loosely between the dura mater externally and the pia mater internally. Between the pia mater and the arachnoid membrane in some situations there are considerable intervals (subarachnoid spaces). The corresponding interval between the arachnoid and dura mater is called the subdural space. See NERVOUS SYSTEM AND BRAIN.

**A'RA CŒ'LI** (Lat. Altar of Heaven). The name given to the famous church of the Virgin erected on the summit of the Capitoline Hill in Rome. It was the only Christian edifice on the Capitol, and was for centuries called Sancta Maria in Capitolio; but popular legend connected it with the possession by Christianity of the stronghold of paganism, and the Middle Ages imagined a dream of Augustus, to whom the Sibyl announced that here was the altar of the Son of God; hence *Ara Cœli*. The church took over all the celebrity of the pagan Capitol, and was the meeting-place for the city council and the people. The present edifice is a basilica dating chiefly from the ninth century, with a handsome Renaissance ceiling.

**ARAD,** ŏr'ŏd. Two towns of the kingdom of Hungary. 1. *Old Arad* (Hung. *O-Arad*). The capital of the county of Arad, situated on the right bank of the Maros, a tributary of the Theiss, about 37 miles north of Temesvár (Map: Hungary, G 3). The town has many handsome streets and fine modern buildings, such as the theatre, town hall, and the palaces of justice and industry. The former strong fortifications are now rather out of date. Arad is the seat of a Greek-Oriental and of a Rumanian bishop. It is one of the most important commercial and industrial towns of Hungary. Its manufactures include alcohol (one of the largest distilleries in Europe), starch, leather, and machinery. There is a considerable export trade in grain, tobacco, wine, and cattle. Pop., 1890, 42,050; 1900, 56,260; 1910, 63,166.

During the seventeenth century it was often captured by the Turks. Fortifications erected in 1763 made Arad an important position in the Revolutionary War of 1848–49, when it was occupied for a considerable time by the Austrian general, Berger, who capitulated here in July, 1849. From this place Kossuth issued the last proclamation to the Hungarian patriots. After the capitulation at Világos, Aug. 13, 1849, Arad was surrendered to the Russians by the order of Gorgey. Here, on October 6 of the same year, a number of Hungarian generals were executed by order of the Austrian commander, Haynau. A beautiful monument commemorating this event stands in Liberty Square. In 1909 a bronze monument to Kossuth was erected.

2. *New Arad* (Hung. *Ujarad*). A town in the county of Temes, on the left bank of the Maros opposite Old Arad, with which it is connected by a long wooden bridge. It has a large trade in flour and wood. Pop., 1910, 6006.

**AR'ADUS.** See ARVAD.

**ARÆ'OSTYLE.** See INTERCOLUMNIATION.

**ARAF,** är'äf, or more accurately AL A'RĀF. The name given in the Koran (Sura vii, 44) to the partition separating heaven from hell. Mohammed vividly portrays those standing by the partition saluting the happy inhabitants of Paradise without being able to enter it, while on the other hand they are also terrified at the sight of those who are condemned to the tortures of hell-fire. In Mohammedan theology al-Araf is a sort of limbo for those whose good and evil works so balance one another that they cannot enter Paradise until the last day of judgment; but in addition to this class, there are others who, according to the views of some theologians, are consigned to al-Araf.

**ARAFAT,** ä'rä-fät', MOUNT, or JEBEL AL-RAHMAH (Mount of Mercy). A granite hill some 12 miles east of Mecca. According to a Mohammedan legend, when Adam and Eve were cast forth from Paradise for eating the wheat which deprived them of their pristine purity, Adam fell at Ceylon, and Eve on Mount Arafat; and after much wandering Adam finally joined Eve on this mountain, where they recognized each other (*ta'ārafa*). The object of this story is to account for the name; but other etymologies have also been proposed by Arabic authors. The mount is about 200 feet high and a mile and a half in circuit. It is the real goal of the Mohammedan pilgrimage to Mecca, for while the visit to the Kaaba—the sanctuary at Mecca—may be made at any time, it is known as the "small pilgrimage." The "great pilgrimage," which ends with a visit to Arafat, can only be made in the month *Dhu'l-Hijjah*, i.e., 'month of pilgrimage.' The ninth day of this month, the most sacred of the year, is spent by the pilgrims at Arafat, to which they proceed in a body on the evening of the eighth day. The day is spent in prayers and in listening to a sermon which always lasts many hours. On the top of the mount, above the platform where the *wukuf*, or sacred assembly is held, there was once a shrine which was destroyed by the Wahabites (q.v.). This shrine is said to have had the name of Ilal, though this may have been the name of the god worshiped there in pagan times. Consult Burton's account in his *Pilgrimage to El-Medina and Kaaba, Mecca and Medina*, chap. xxviii; Snouck-Horgronje, *Het mekkaansche Feest* (1884–89).

**ARAGO,** ăr'ä-gō; *Fr. pron.* ä'rä'go', DOMINIQUE FRANÇOIS (1786–1853). A celebrated French astronomer and natural philosopher, born at Estagel, near Perpignan, in the Department of Basses-Pyrénées. At the age of 17 he entered the Ecole Polytechnique at Paris, where the

spirit, promptitude, and vivid intelligence he exhibited in his answers to the questions of Legendre excited the admiration of every one. In 1805 he became secretary to the Bureau des Longitudes at Paris. Two years afterward he was engaged, with Biot and others, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. Arago and Biot had to extend it from Barcelona to the Balearic Islands. The two savants established themselves on a lofty summit near the eastern coast of the Spanish peninsula, where they lived for many months, communicating by signals across the Mediterranean with their Spanish collaborators in the little isle of Iviza. Before Arago completed his calculations, Biot had returned to France, and war had broken out between France and Spain. Arago was now held to be a spy; his signals were interrupted; and with great difficulty he succeeded in making his escape to Majorca, where he voluntarily imprisoned himself in the citadel of Belver, near Palma. At last he obtained his liberty on condition of proceeding to Algiers, which he did; but on his way back to France was captured by a Spanish cruiser, and sent to the hulks at Palamos. He was, however, liberated after a time and sailed once more for France; but almost as he was entering the port of Marseilles, a tempest arose which drove the vessel across the Mediterranean all the way back to the coast of Africa, landing it at Bougia. He went by land to Algiers, where he was compelled to remain about half a year, and whence he again set out for Marseilles in the latter part of June, 1809. After having narrowly escaped another capture by an English frigate, Arago finally found his way to Marseilles. As a reward for his sufferings in the cause of science, the Paris Academy of Sciences suspended its standing rules in his favor; and though only 23 years of age, he was elected member in the place of Lalande, who had just died, and was appointed professor of analytical geometry and geodesy in the Ecole Polytechnique. Afterward his attention was devoted more to astronomy, magnetism, galvanism, and polarization of light. In 1811 he read before the Academy a paper of fundamental importance on chromatic polarization. In 1812 he began his extraordinary course of lectures on astronomy, etc., which fascinated all Paris—the savants by their scientific rigor and solidity, the public by their brilliancy of style. In 1816, along with Gay-Lussac, Arago established the *Annales de Chimie et de Physique* and demonstrated the value of the undulatory theory of light. In the same year he visited England, making the acquaintance of various persons distinguished in science, especially Dr. Thomas Young. In 1818 appeared his *Recueil d'observations géodésiques, astronomiques, et physiques.* In 1820 he turned his facile and inventive genius into a new channel and made several important discoveries in electro-magnetism. Oersted had shown that a magnetic needle was deflected by a voltaic current passing along a wire. Arago pursued the investigation and found that not only a magnetic needle, but even non-magnetic substances, such as rods of iron or steel, were subject to deflection, exhibiting during the action of the voltaic current a positive magnetic power, which, however, ceased with the cessation of the current. Some time after, he demonstrated that a bar of copper and other non-magnetic metals, when moved circularly, exert a noticeable influence on the magnetic needle. For this discovery of the development of magnetism by rotation, he obtained in 1825 the Copley Medal of the Royal Society of London, and in 1834, when he again visited Great Britain, especial honors were paid to him by the friends of science in Edinburgh and Glasgow. Four years previous to this second visit to Great Britain he was made perpetual secretary of the Academy and director of the observatory, a position which he retained till his death. As secretary of the Academy he wrote his famous *éloges* of deceased members, the beauty of which has given him so high a place among French prose writers. In politics, too, his career was remarkable. He was a keen Republican and took a prominent part in the July Revolution of 1830. In the following year he was elected by Perpignan as member of the Chamber of Deputies, where he occupied a position on the extreme Left. In the February Revolution of 1848 he was chosen a member of the Provisional government, and appointed Minister of War and Marine. In this position he resisted the proposed measures of the Socialist party, regarding the Constitution of the United States as the ideal of democracy. His popularity in his own department was the means of preventing the discontented population of Basses-Pyrénées from proceeding to lawless and violent measures. He opposed the election of Louis Napoleon to the presidency, declared himself against the policy of the new ministry, and refused to take the oath of allegiance after the coup d'état of 1851. Napoleon, in a letter, paid a high tribute to his talents and virtues and excused him from taking the oath as director of the observatory. In his general character Arago was sociable and a brilliant conversationalist. He was the intimate friend of Alexander von Humboldt. His collected works, edited by Barral, were published in Paris (17 vols., including a biography of Arago, 1854–62). Alexander von Humboldt wrote an introduction to the German translation of Arago's works.

**ARAGO,** ETIENNE VINCENT (1802–92). A French dramatist and politician, a brother of the famous astronomer, Dominique François Arago, born near Perpignan, Basses-Pyrénées. He was the author, with various collaborators, of about 100 comedies and vaudeville pieces which were successfully produced in Paris, among them *Les Pages de Bassompierre* and *Les Mémoires du diable*, and was director of the Vaudeville from 1829 to 1840. As a journalist, he was one of the founders of *La Réforme*, an advanced Republican newspaper. His poetical comedy, *Les Aristocraties* (1847), the success of which at the Théâtre Français was ended only by the Revolution of 1848, was an expression of the same radical sentiments which made him, as a member of the Constituent Assembly, an opponent of Louis Napoleon's pretensions and caused his own exile (1849–59). His highest political station had been that of director-general of the post office for several months in 1848. Upon the restoration of the Republic in 1870 he resumed a position of influence, being for a short time mayor of Paris. In 1871 he was elected to the National Assembly, but soon resigned. He became archivist of the Ecole des Beaux-Arts in 1878, and later director of the Musée du Luxembourg. Besides his dramatic

works he also wrote several volumes of historical and other verse and a novel.

**ARAGO,** François Victor Emmanuel (1812–96). A French politician, son of the astronomer. He became an ardent Republican, and on Feb. 24, 1848, when the abdication of the King was announced in the Chamber, Arago, who had penetrated thither, demanded the deposition of the Orleans family and protested in the name of the people against a regency. Under the provisional government he was sent to Lyons as commissary-general and prevented a serious insurrection by applying half a million francs to relieve immediate distress. A little later he was elected to the Constituent Assembly and was soon sent as envoy to Prussia, where he interested himself for the oppressed Poles, procuring the liberation of General Microlawski. He resigned as soon as Louis Napoleon was elected to the presidency and became in the Constituent, and later in the Legislative Assembly, one of the future Emperor's most active opponents, vigorously protesting against the expedition to Rome. After the coup d'état (Dec. 2, 1851), he quitted political life and returned to his law practice, but in 1870 became a member of the Government of National Defense, first as Minister of Justice, and later as Minister of the Interior, replacing Gambetta in the latter office. In 1871 he was elected a member of the National Assembly, and on the organization of the Senate in 1876 he was elected to that body, where he sat until his appointment as Ambassador to Switzerland in 1880. He retired in 1894.

**ARAGO,** Jacques Etienne Victor (1790–1855). A French traveler and writer, brother of the astronomer. In 1817 he accompanied an expedition, under Freycinet, in a voyage round the world. Afterward he wrote plays, poems, and novels, and in 1835 undertook the management of the theatre at Rouen, but having become blind in 1837, he resigned. His early voyage he described in two books of travel, *Promenade autour du monde* (1822) and *Voyage autour du monde* (1838). In 1849, though deprived of sight, he formed a company of prospectors and started for California in search of gold. But his companions deserted him at Valparaiso. On his return he published his painful experiences under the title, *Voyage d'un aveugle en Californie et dans les régions aurifères* (1851). He died in Brazil.

**ARAGON,** ăr'ă-gon. A captaincy-general of Spain and former kingdom, situated in the northeastern part of the country, and bounded on the north by the Pyrenees, which separate it from France, on the east by Catalonia and Valencia, on the south by Valencia and New Castile, and on the west by New and Old Castile (Map: Spain, E 2). It comprises the three provinces of Saragossa, Teruel, and Huesca, with a total area of 18,298 square miles. The southern and northern parts of the country are mostly mountainous, while the central portion is occupied by a plain, intersected by the Ebro and its tributaries. The climate is varied, owing to differences in elevation. In the mountains it is cool, while in the lower parts it is exceedingly hot and dry. This difference of climate is accompanied by corresponding variation in vegetation, and the agricultural products of the region embrace the hardier grains, such as corn and wheat, as well as delicate fruits like the olive and vine. Agriculture is in a backward state owing in part to scarcity of population, but chiefly because of the burdens laid by the government on agrarian communities. In the province of Teruel are found deposits of sulphur, copper, lead, and salt, which are mined to some extent. The manufacturing industries are confined to the production of linen and woolens and some leather goods. The commerce of the region is insignificant on account of the agricultural and industrial backwardness, as well as of the lack of transportation facilities. Pop., 1887, 912,197; 1897, 892,513; 1900, 912,711; 1910 (census of December 31), 952,743. Capital, Saragossa, pop. commune (1910), 111,704.

Aragon came into the possession of Rome after the overthrow of the Carthaginian power in Spain, and was made a part of the province of Hispania Tarraconensis. It was conquered by the Visigoths early in the fifth century, and these in turn were subdued by the Moors after 711. A remnant of the Christian inhabitants who escaped to the mountains and settled in the region between the Sierra de la Peña and the Pyrenees managed to maintain their independence. For a long time Aragon was ruled by counts of Gothic origin. Subsequently it was incorporated with Navarre, but in 1035 it attained its independence under Ramiro I, the son of Sancho the Great, and now made its appearance as a kingdom. A long conflict was carried on with the Arabs, amounting, perhaps, to nothing more at times than mere guerrilla raids, but resulting in the gradual acquisition of individual strongholds and towns. On the capture of Huesca in 1096, the capital of the country was removed from the mountain valleys to the plateau of northern Spain. The conquest of Saragossa in 1118 brought the valley of the Ebro under the rule of the kings of Aragon. In 1137 Aragon was united with Catalonia by the marriage of Petronella, the daughter of Ramiro II, with Count Raymond Berengar IV of Barcelona. This union at once raised Aragon to a prominent position in the Iberian peninsula. Through the activity of the seafaring population of Catalonia, the kings of Aragon gained possession of the Balearic Islands, Sicily, Sardinia, and Naples in the course of the two following centuries. At the same time the consolidated strength of the kingdom was directed against the Mohammedans, and in 1238 the important city of Valencia, with the surrounding region, fell into its power. Aragon has been noted for its free political institutions in the Middle Ages; as a matter of fact, the great mass of the population was without any political rights; only a few had the privileges. But the power of the king was greatly limited by the privileges enjoyed by the towns, which in effect formed a republican state within the monarchy. Their affairs were administered by municipal officers, and their representatives met in *juntas*, which were charged with the maintenance of public safety and the control of common affairs. At the head of the united towns stood the justiciar of Aragon, to whom, on certain questions, even the king had to yield. The towns availed themselves of the king's financial embarrassments to wring charters of privileges from the crown. Pedro IV, in the fourteenth century, first attempted to assert the power of the crown over the cities; but though he was partially successful, the task was not completed until after the union of Aragon with Castile. During this period Barcelona developed into

one of the greatest Mediterranean ports and entered into rivalry with the Italian cities, and especially with Genoa, against which continual wars were waged. By the marriage of Ferdinand of Aragon with Isabella, heiress to the crown of Castile, in 1469, the two states were united in 1479. The bond between the two, however, was only a personal one until 1516, when, on the accession of Charles I, the states were definitely merged into a new Spain, with which the subsequent history of Aragon is identified. During the later Middle Ages the history of Aragon was closely connected with that of Sicily (q.v.).

**ARAGONA,** ä'rà-gō'nà. A city of Sicily, 78½ miles by rail south of Palermo, and 6½ miles by rail north of Girgenti (Map: Italy, H 10). In its vicinity are rich sulphur mines, and the mud-volcano of Maccaluba, 135 feet high and 860 feet above the sea, which emits carbureted hydrogen gases. Pop., 1900, 11,985; 1911, 15,961.

**AR'AGONITE** (named after Aragon, see below). An anhydrous calcium carbonate, identical with calcite (q.v.) in composition but differing from it by crystallizing in the orthorhombic system. Aragonite occurs in prismatic crystals, sometimes pseudo-hexagonal in shape. It is also found in radiated aggregates of needle-like forms. Further, stalactite, incrusting, columnar, and coral-like forms occur, the last named being known as *flos ferri*, from its occurrence in beds of iron ore. The prevailing color of aragonite is white, shading into violet, yellow, and pale green in some varieties. Its lustre is vitreous. A silky, fibrous variety is known as *Satin spar*. Aragonite was first found in Aragon, Spain, whence its name. In the United States aragonite is found in several localities in California, Connecticut, Illinois, Missouri, New Mexico, Pennsylvania, and New York. The well-known varieties of Mexican onyx, largely used by architects for wainscoting and interior decoration, are forms of aragonite.

**ARAGUATA,** ä'rà-gwä'tà (native name). The ursine howler. See HOWLER.

**ARAGUAYA,** à-rä'gwà-yä', or RIO GRANDE. A large river of Brazil, rising in the Sierra Cayapo, in lat. 18° 10' S. and long. 51° 30' W. (Map: Brazil, H 5). It flows northeasterly between the states of Goyaz and Matto Grosso, inclosing in its course the large island of Bananal (q.v.). Near San Francisco, in lat. 5° 30' S., the Araguayú joins the Tocantins, which empties into the Atlantic Ocean about 50 miles to the east of the main estuary of the Amazon. The Araguayú is more than 1300 miles long and navigable in stretches for more than half that distance, but falls and rapids hinder its use as a route of trade. A line of small steamers plies its waters to the rapids of Santa Maria.

**ARAI HAKUSEKI,** ä'rī hä'kōō-sā-kē (1657–1725). One of the most noted of modern Japanese scholars, Confucianists, and stylists, who, by his life and writings, illuminated and adorned the ideas that long molded Japanese society. When Iyeyasu "caused confusion to cease and order to prevail," native and Chinese learning revived in Japan, and a brilliant group of scholars in Yeddo set forth the philosophical doctrines of Chu-Hi. Of these, Hakuseki is best known. He became more liberal than his master, Seiga, but he was still orthodox, as against the Kogaku, or (in government view) "heretical" school of philosophy. As patronized by Iyeyasu and his successors, the Tycoons, from 1615 to 1868, this philosophical system became a sort of established church, and heretics were made to feel severe political opposition, which sometimes ended in imprisonment and death. Yet scattered over the country, the pupils of Hakuseki and other masters instructed young gentlemen and helped powerfully to mold the public opinion by which the Mikado was restored to power in 1868. Hakuseki left an autobiography (written in 1716), a very rare kind of literature in Japan, which, however, was not destined for publication. In 1701 he composed his greatest work, the *Hankampu*, a history of the Daimios of Japan from 1600 to 1680. This work is in 30 volumes, and though requiring immense research, it was completed in a few months. After this his most important work is the *Tokushi Yoron*, a general view of Japanese history for 2000 years. His *Seiyō Kibun*, or 'Annals of the Western Ocean,' which was translated by S. R. Brown, in the *Transactions* of the North China Branch of the Asiatic Society (London, 1827–31), is the first attempt of a Japanese writer to give an account of Europe. Consult Aston, *History of Japanese Literature* (New York, 1899), and Florenz, *Geschichte der japanischen Litteratur* (Leipzig, 1906).

**ARAKAN,** ä'rà-kän', or ARACAN. The northern division of Lower Burma, British India, extending along the Bay of Bengal from about 18° to 21° 33' N. lat., and covering, with the adjacent islands, an area of 18,540 square miles (Map: Burma, Siam, B 3). The surface is very mountainous in the interior, which is traversed by several parallel ridges. There are vast forests and marshes covered with a thick growth of grasses and underbrush. The lower part of the country is intersected by many streams from the hills and is especially well adapted to the cultivation of rice, indigo, pepper, and raw sugar. Many tropical fruits grow wild. Petroleum, iron, and coal are found, and the chief articles of export are rice, salt, and teak wood. The chief port is Akyab (q.v.). The town of Arakan, situated in the interior to the northwest of Akyab, which before the British conquest is said to have numbered nearly 100,000 souls, is a place of ruins. The natives of Arakan are shorter and somewhat less round-headed than the Burmese proper, with whom they belong by race and language. A caste system with monogamy prevails among them. The population increased from 671,899 in 1891 to 760,848 in 1901. About 70 per cent of the inhabitants are Buddhists, while the remainder are chiefly Mohammedans. Arakan was once an independent kingdom, but began to decline at the end of the seventeenth century because of internal strife. A century later it fell into the possession of Burma, from which it passed to Great Britain in 1826. Anthropological details concerning the peoples of Arakan will be found in Lewin, *Wild Races of Southeastern India* (London, 1870), and Risley, *Tribes and Castes of Bengal* (Calcutta, 1891).

**ARAKTCHEYEFF,** ä'rák-chā'yĕf, ALEXEI ANDREYEVITCH, COUNT (1769–1834). A Russian statesman. Of noble though poor family, he rose rapidly to high rank under the favoritism of Paul, who made him commandant of his bodyguard at Gatchina. On his accession to the throne, Paul made him commandant of St. Petersburg, conferred upon him the baronial title, dismissed him in a short while, made him Count in 1799, and again retired him in eight

months. After Paul's assassination, Araktcheyeff was kept near the person of Alexander I, became Minister of War in 1806, and in the late years of that Emperor's reign was his all-powerful adviser in matters of internal policy. The will of the Emperor, whom he almost worshiped, was carried out at all hazards, and as the energetic Araktcheyeff did not stop short of any cruelty, his name became synonymous with terror to all liberal thinkers. In 1833 he deposited 50,000 rubles, of which three-quarters of the principal and accumulated interest is to be awarded in 1925 for the best history of Alexander's reign. It was provided that the remainder shall cover the expense of printing the work, to form a second prize, and to be paid for translations of the work into French and German. As he left no heirs and made no will, Nicholas I granted his estate at Gruzino and all his possessions to the Novgorod Corps of Cadets, henceforth known as Araktcheyeff Corps, so as to perpetuate the memory of the statesman.

**ARAL,** ăr'*al* (*Russ. pron.* å-räl'), or **ARAL-DENGIS, LAKE** (for derivation, see below). A lake between 150 and 200 miles east of the Caspian Sea, within the limits of Russian central Asia, between lat. 43° 43′ and 46° 45′ N., and traversed by the meridian of 60° E. long. (Map: Asia, E 4). It lies in the Aralo-Caspian lowlands, is bounded by the steppes and deserts of Khiva, by the land of the Kirghis, and by the plateau of Ust-Urt, separating it from the Caspian. Its greatest length is about 230 miles; its greatest width is 182 miles; and its area, according to Strelbitski, is 25,050 square miles; this does not include its four large islands, occupying about 1000 square miles. After the Caspian Sea it is the largest lake in the Eurasiatic continent, and, next to Lake Superior and the Victoria Nyanza, it is the fourth largest in the world. It lies at a height of 163 feet above the level of the ocean and about 250 feet above that of the Caspian. Its numerous islands gave rise to its name of Aral-Dengis (Khirghiz, Turk. *aral,* island + *dengis,* sea, lake). The largest of these is Nikolai. The bluish tinge of its water suggested to the Russians the name of Blue Sea. In ancient times it was called the Lake of Oxiana, and during the Middle Ages the Sea of Khovaresm, or Khuarism. It is fed by the Syr-Darya (the ancient Jaxartes) on the east side and the Amu-Darya (or ancient Oxus) on the south. It is shallow, its average depth hardly reaching 50 feet. There are unmistakable signs of its drying up, especially in its southern part. It is a salt-water lake, but contains less salt than the ocean, and freezes to a considerable distance from the shore. It is very rich in fish, which are caught here in great quantities, sturgeon, herring, carp, and some seals being the most important. In spite of the fact that there are many kinds, it is remarkable that there are none of the salt-water variety. In the affluents the Scaphirhynchus species has recently been discovered, a variety not found anywhere else in the world at present, but abundant in the Tertiary period. Owing to the shallowness of its waters, navigation is difficult; but Russian steamers have been launched upon it, and took part in the operations against Khiva in June, 1873. Its history is very remarkable. Sir Henry Rawlinson and Colonel Yule collected references made to it in Greek, Latin, Arabic, and Persian writers and tried to establish the fact that the area it now occupies has been dry land twice within historical times—the Jaxartes and the Oxus then running south of the Sea of Aral to the Caspian. It is very remarkable that the Amu (Oxus) changed its bed considerably within one decade, as is proven by a comparison of the maps carefully prepared in 1859 and 1870. See *Proceedings of Royal Geographical Society,* vols. xi, xvi, and i (N.S., 1879); also *The Shores of Lake Aral,* by Major Wood (London, 1876); *Nachrichten uber den Aral-See und den unteren Lauf des Amu-darja, von den altesten Zeiten bis zum XVII Jahrhundert,* von Dr. W. Barthold (from the Russian original by H. von Foth, Leipzig, 1910).

**ARA'LIA** (derivation uncertain). A genus of plants, the type of the family Araliaceæ. These plants are dicotyledonous, and consist of trees, shrubs, and herbaceous plants, resembling the Umbelliferæ, both in their general habit and in their botanical characters, but differing essentially in the fruit, which is not formed of two separable carpels as in the Umbelliferæ. The fruit of the Araliaceæ consists of several one-seeded cells and is often succulent. The family contains about 400 known species, natives of tropical, temperate, and cold climates, generally possessing stimulant and aromatic properties. The principal genera are *Aralia, Panax, Hedera,* and *Fatsia.* Poisonous qualities are not developed as in the Umbelliferæ. The herbage of many species affords good food for cattle, and some are used for human food. The genus *Aralia* contains a considerable number of species —trees, shrubs, and herbaceous plants. *Aralia nudicaulis,* commonly called wild sarsaparilla, is a native of the United States. It is a species of low growth, having a solitary radical leaf with a trifid stalk and ovate serrated segments; the scape is shorter than the leaf. The root is said to be equal in value to sarsaparilla as an alterative and tonic. *Aralia racemosa,* well known as spikenard, has large, spicy, aromatic roots. *Aralia spinosa,* and *Aralia hispida,* also natives of North America, produce an aromatic gum-resin. *Aralia spinosa* is sometimes called toothache tree; it also bears the name of angelica tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 feet, with a single stem, spreading head, doubly and trebly pinnate leaves, and ovate leaflets, and is very ornamental in a lawn. *Aralia polaris,* found in the southern island of New Zealand, and in the greatest abundance and luxuriance in the Auckland Islands, is a herbaceous perennial, 4 to 5 feet high, with large orbicular masses of green foliage and waxy flowers, which present a very striking appearance. *Aralia edulis,* now called *Aralia cordata,* is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavor, are used by the Japanese as carrots or parsnips are by Europeans. This plant has recently been introduced into cultivation in the United States under the name "Udo." Aralias abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Chinese rice paper is cut from cylinders of the pith of *Aralia papyrifera,* or *Tetrapanax papyriferum.* Ginseng, the root of *Panax quinquefolium,* is one of the most impor-

tant products of the family Araliaceæ. Large quantities of ginseng are collected and shipped to China, where wonderful medicinal qualities are attributed to it. For fine specimens almost fabulous prices are paid. Modern pharmacy does not consider it of great value. The astringent roots of *Gunnera scabra*, sometimes classed with the *Aralias*, are used in tanning, and its fleshy leaf-stalks are eaten like those of rhubarb. It has been seen on the sandstone cliffs of Chile with leaves nearly 8 feet in diameter, each plant bearing four or five of these enormous leaves. It has been introduced into Great Britain and is found to succeed well in the climate of Edinburgh. The only representative of this family in the British flora is the ivy (q.v.), *Hedera helix*. *Fatsia horrida*, a member of this family, is common along the Pacific coast, extending well into Alaska. It has slender, rope-like stems, crowned with large leaves. Stems and leaves are covered with prickles that sometimes make severe sores upon persons who come in violent contact with them. The popular name for the plant is Devil's Club.

**Fossil Forms.** The genus Aralia and an allied genus, *Araliæphyllum*, have been described from many localities in the Cretaceous and Tertiary rocks of North America and Europe, where they are represented by about 25 species.

**A'RAM,** EUGENE (1704–59). An English schoolmaster and scholar, born at Ramsgill, Netherdale, in Yorkshire. His father was a gardener and could afford to keep Eugene at school for only a short time; but even while assisting his father the boy found time for study. He married early and became a schoolmaster, first in Netherdale and afterward at Knaresborough, where he continued to teach till 1745. At Knaresborough lived one Daniel Clarke, a shoemaker, and an intimate acquaintance of Aram. On one occasion Clarke happened to buy a quantity of valuable goods, which he easily obtained on credit; but, to the surprise of everybody, he soon after disappeared, and no trace of him could be discovered. Suspicion lighted upon Aram, not as Clarke's murderer, but as his confederate in fraud. His garden was searched, and in it were found some of the goods which Clarke had bought. Aram was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough and went to London and other parts of England, teaching here and there, and, in spite of his roaming life, contrived to acquire a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish and planned a comparative dictionary of all the European languages. His most important scholastic achievement was his discovery of the similarity of the Celtic to other European languages. He was at work on his dictionary when he was suddenly dragged away from his ushership at Lynn Academy, in Norfolk, and committed to prison on a charge of murder. The remainder of the story is well known. In 1759 a skeleton was dug up near Knaresborough, which the inhabitants suspected to be that of Clarke; for they had now come to the conclusion that the unfortunate man had met with foul play, especially as Aram's wife had, on several occasions, made strange statements to the effect that her husband and a man named Houseman knew more of Clarke's disappearance than they chose to tell. Houseman was now confronted with a bone of the skeleton which had been discovered. He very emphatically denied that it was Clarke's. People naturally wondered how he could be so positive, and they became convinced that if the skeleton was not Clarke's, Houseman must know where Clarke's body was. At last he confessed that he had been a spectator of the murder of Clarke by Aram and one Terry. He named the place where the body had been hidden. The skeleton was dug up, and Aram was tried at York for the murder of Clarke, on Aug. 3, 1759. He conducted his own defense and attacked, with great acumen, the doctrine of circumstantial evidence; but to no effect, for a verdict of guilty was returned, and he was condemned to be executed within three days. In the interval he confessed his guilt to two clergymen. While in the condemned cell he wrote a defense of suicide, but failed in a practical illustration of the doctrine. For further details consult N. Scatcherd, *Memoirs of Eugene Aram* (London, 1838), and for an idealized portrait, Bulwer's novel, *Eugene Aram* (London, 1832): also Hood, *The Dream of Eugene Aram* (London, 1845).

**AR'AMÆ'ANS.** A branch of the Semites (q.v.). The remarkable spread of Aramaic speech beyond the limits of the kindred groups that originally developed and employed it (see ARAMAIC) renders it often difficult to determine the true ethnic relations of peoples whose language might lead to their classification as Aramæans. But a number of important states in north Syria and in Mesopotamia and many nomadic or semi-nomadic tribes south of Assyria and east of Babylonia are so distinctly referred to as Aramæans (Heb. *aram*, pl. *aramim*, *'am aram*, 'people of Aram'; Ass. *aramu*, *arame*, *arime*) in our oldest sources that there is little room for doubt in regard to their character. Thus Damascus is called Aram-Damascus or only Aram in the Bible; in the inscription of Zakir, King of Hamath and Laash, Bar Hadad of Damascus is styled "king of Aram," and Pognon is perhaps right in reading one of the Assyrian designations of the Damascene territory, *'mat* Aram, 'the country of Aram.' Aram Zobah occurs as well as Zobah (Coele Syria), Aram Beth Rechob and Beth Rechob (south of Lebanon), Aram Beth Maakah and Beth Maakah (south of Hermon), in Hebrew sources; and Geshur (in Jolan) is said to be "in Aram" (2 Sam. xv. 8). As Zakir distinguishes Bar Hadad as "king of Aram," it may perhaps be inferred that neither Hamath nor any of the other north Syrian states mentioned in the inscription, such as Hadrak, Unki, Gurgum, and Kue, was Aramæan in the ninth century. The distinction in language between the earlier Hadad and Panamu inscriptions and the later Bar Rekub inscription suggests that neither Samal nor Jaudi was peopled by Aramæans, but that an Aramaic-speaking military colony was put in Samal. Aram Naharaim, the Narima of the Tel el-Amarna tablets, and Naharin of the Egyptian inscriptions, was clearly located between the Belich, the Chabur, and the Euphrates, and between this river and the Orontes. After the downfall of the Mitannian (q.v.) power this region became definitely Aramæan. The most important city was Harran (q.v.). Bit Adini (see BETH EDEN), between the Belich and the Euphrates, with its capital, Tell Barsib, was perhaps the most formidable Aramæan state with which the Assyrians had to cope. Northeast of it were Shupria and Bit Zamani, with its capital Amida, and south of it Bit Chadippe,

Lake, Hindan, and Suḫu, with its fortress Suru, immediately above the Babylonian border. Between the lower Zab and the Diyala were the Itu and the Gurumi; between Elam and Babylonia, farther south, the Bagdadu, the Hindaru, the Tukudu, and the Gambulu. Over 40 tribes are mentioned as belonging to the Arumi, or 'the Aramaic hordes' (*ahlamê aramaiê*). Some of them also lived in Babylonia between the Tigris and the Euphrates; and large numbers crowded into the cities, especially Sippar, Nippur, Uruk, Kish, Kutha, and Babylon itself.

It is not known where the original home of the Aramæans was. Amos (i. 5) threatens the Aramæans of Damascus, Bikat Aven (Coele Syria), and Beth Eden with deportation to Kir and declares (ix, 7) that Yahwe has brought Aram from Kir, Israel from Egypt, and the Philistines from Caphtor (Crete). In Isa. xxii. 6, 7, Kir is mentioned along with Aram, Elam, and apparently Shot (Suti). Winckler has suggested that Kir may refer to the Kares (*Κᾶρες*) mentioned by Arrian (iii, 8, 5) together with the Sittakenes (Suti), and the city of Karai (*Κάραι*) is said by Diodorus (xix, 12, 1; xvii, 110, 3) to be four days south of Sittacene. There was probably a tradition in the time of Amos that the Aramæans of Syria and Mesopotamia had come from this region between the Tigris and the mountains of Elam; and he held out the prospect of their return from present prosperity to former poverty, barbarism, and insignificance. Other traditions seem to be represented by the genealogies of Aram (Gen. x. 22, 23) and Nahor (Gen. xxii. 21–24). Few of the names can be identified with known tribes or localities, but they apparently point to north Syria, the Syrian Desert, and Mesopotamia. As one of the sons of Nahor is Kesed, the eponym of the Chaldæans (Kasdim), this may explain the statement in Deut. xxvi. 5, "A nomad Aramæan was my father." Modern scholars generally assume that the Aramæans pushed their way from northwest Arabia into Syria, Mesopotamia, Assyria, Babylonia, and the district beyond the Tigris, and the movement is supposed to have begun in the middle of the second millennium B.C. In the course of time they gave their language to many nations, spread the use of the alphabet far and wide, and exercised a profound influence on the development of civilization. Consult: Nöldeke in *Zeitschrift d. Morg. Ges.*, xxv, 113, and article "Aram" in *Encyclopædia Biblica* (1899); Ed. Meyer, *"Die Israelitien*, p. 235 (1906); Sina Schiffer, *Die Aramaer* (1911).

**ARAMAIC.** The language spoken by the Aramæans (q.v.) and by a number of peoples adopting their speech. It is doubtful how much of the inscriptional material or of the later literature can be regarded as coming from men of Aramæan blood. The Nerab priests may have been Aramæans, but Zakir, of Hamath, clearly distinguishes himself in this respect from Bar Hadad, of Damascus, whom he calls "king of Aram," and the kings of Samal and Yaudi do not seem to have been Aramæans. The Elephantine papyri were written by Jews and Samaritans. The Nabatæans were Arabs. While the common people in Palmyra were Aramæans, the aristocracy, consequently the literary class, were also Arabs. In the kingdom of Osrhoene, the Aramæans no doubt formed an important ethnic element, but the reigning family and the dominating circles were of Arabic origin. Akkadians, Assyrians, Mitannians, and Hittites had left their strains in the blood, and large masses of the old Aramæan population had been put to death or deported by the Assyrians. In southern Babylonia, where the Gnostic sect of the Mandæans chiefly made its converts, the population was at all times very mixed.

Used as a medium of international communication already in the time of the later Assyrian (cf. 2 Kings xviii. 26) and Chaldæan empires, and adopted as the official language of the Achæmenian Empire, the Aramaic gradually became the vernacular of many nations. It was employed in daily life, while the native languages, Assyrian, Akkadian, Hebrew, Phœnician, and others, became less generally used, being restricted to certain localities and circles of society, the public worship, and the assemblies of the learned. A language thus perpetuated by foreigners naturally developed many dialectical differences. Religious reasons also occasionally accentuated these. Both Jews and Mandæans spoke Babylonian Aramaic, but the former were influenced by the language of the Hebrew Bible. Monophysitism caused a break between Jacobites and Nestorians which affected to some extent the dialects they spoke; and the religious exclusiveness of the Jews and Samaritans tended to make their dialects diverge. Nevertheless, Aramaic has everywhere certain morphological and syntactical peculiarities that differentiate it from other Semitic languages. Perhaps the most characteristic is the emphatic ending *a* of the noun, originally a post-positive definite article, though it later lost this force and was employed even in the case of an indefinite noun. The only analogy in Semitic to this *status emphaticus* is the enclitic demonstrative or post-positive article *an* in Minæo-Sabæan. Between the Aramaic dialects spoken in the Tigris and Euphrates valley, from the Armenian mountains to the Persian Gulf, and all the western dialects there is the striking difference that the former used an initial *n* (sometimes even an *l*) for the *y* of the latter in 3 masc. sing. and pl. of the imperfect.

As regards the script the old North Semitic alphabet was substantially the same during many centuries, whether it was used for Phœnician, Moabitish, Aramaic, or Hebrew. (See ALPHABET.) On the part of Aramaic-speaking peoples, however, there grew up a tendency to give to the letters a *square* form. The development of this type can be followed most clearly in Egypt, where it appears as early as on the Sakkarah (482 B.C.) and Carpentras (fourth century) steles and, in spite of the more cursive hand, in the Elephantine papyri (fifth century). It had reached a high degree of perfection in the Palmyrene and Nabatæan inscriptions of the first century B.C., and was used by Hyrcanus, son of Tobias (183–176 B.C.) in his inscription at 'Arak el Emir. The Syriac inscription in the tomb of Queen Helena of Adiabene (q.v.) shows that Estrangelo was used among the Aramæans to the east of Osrhoene. Estrangelo is closely allied to cursive Palmyrene. It was retained by the Nestorians, while a more cursive hand was cultivated by the Jacobites. Montgomery thinks that the script used on some Babylonian incantation bowls published by him is an earlier adaptation of cursive Palmyrene. The Mandæans employed a script that is closely akin to that on pre-Sasanian coins and the earliest forms of Pahlavi; and the Manichæan texts in Persian language found at Turfan in Chinese

Turkestan are written in an alphabet derived from a later Syriac type.

Our oldest Aramaic inscription is that of Zakir, King of Hamath and Laash (c.800 B.C.), discovered in 1903 by Pognon and published by him in 1907. (See HAMATH.) To the beginning of the eighth century belongs the inscription by Panamu, son of Karil, King of Yaudi, on a stele dedicated to Hadad, found at Gerjin in 1890. From the reign of Tiglath Pileser IV (745–728) come the inscription on the monument to Panamu erected by Bar Rekab and found at Tachtali Bunar in 1888 and that of Bar Rekab found at Zinjirli in 1891. A number of Aramaic inscriptions are found on Assyrian weights discovered by Layard in 1853 at Calah, the modern Nimrud. They come from the reigns of Tiglath Pileser IV, Shalmanezer V (728–722), Sargon (722–705), and Sennacherib (705–681). The two inscriptions from Nerab, near Aleppo, come from the seventh century. There are observations in Aramaic on Babylonian documents from the last Chaldæan dynasty (625–539). The bronze bowl found at Olympia, now at Athens, inscribed to Nagid, son of Mepha, may come from the seventh century. From the sixth comes the great inscription discovered at Taima in northwest Arabia, and also those of Senk Kaleh between Teheran and Tabriz, and Wladikawkaz in the Caucasus. Those found in Mysia, Lycia, Cappadocia, and Cilicia date from the fifth century.

Of very great importance are the Aramaic papyri found on the island of Elephantine at the southern end of Egypt in 1903–06. (See ELEPHANTINE PAPYRI.) In addition to records concerning the affairs of the Jewish community and its Yahu temple, they contain also the Achikar story and a translation of the Behistun inscription. Most of these documents are dated and cover the period from 494 to 400 B.C. The Papyri Blacassiani from Sakkarah and the Papyri Dravettiani from Memphis were probably written in the fifth and fourth centuries. Dated Nabatæan inscriptions cover the period from 40 B.C. to 95 A.D. of the Sinaitic, which are also Nabatæan; three are dated in 190, 211, and 231 A.D. The earliest of the Palmyrene is dated in 9 B.C., the latest in 271 A.D.

We possess literary remains of the Judæan, Samaritan, and Galilean dialects of Aramaic spoken in Palestine. In the Judæan dialect are written the documents in Ezra vi. 8–vi. 18; vii. 12–26, some of which may go back to the fifth century; Dan. ii 4b–vii. 28, probably written in the second century B.C.; the Book of the Hasmonæans; some of the Aramaic words in Josephus and the New Testament; the Fast Rolls; Aramaic sayings in the Mishna; the Targum Onkelos to the Law, and the Targum Jonathan to the Prophets. Only the translation of the Pentateuch is of importance for the Samaritan dialect. The Aramaic sections in the Palestinian Talmud are our chief documents in the Galilean dialect; some sections in Palestinian Midrashim, and a mosaic inscription in Kefr Kenna are also written in this dialect. There is an unmistakable kinship between the Galilean and Christian Palestinian dialects. The latter is now known to us not only through the Jerusalem Lectionary, since in the last few years a number of other works have been discovered. Unfortunately the first Aramaic gospel, written in the Galilean dialect, is lost; and no part of the Christian Palestinian literature seems to be older than the breach between Malikites and Nestorians or Jacobites in the fifth century.

No Aramaic dialect has furnished us with a richer literature than that spoken in Osrhoene. Edessa became one of the great centres of Christianity in the East. Through the translation of the Bible in the second century A.D. the literary language of Edessa spread throughout Mesopotamia and northern Syria, and even into Egypt, as the recently discovered Nile liturgy shows. Until the fourteenth century an extensive literature was produced, embracing not only exegetical, doctrinal, and homiletic expositions, rituals, and religious poetry, but also history and romance. Even after the Arabic conquest Syriac continued for some time to be the current language in Mesopotamia and northern Syria. Among the Sabians of Harran, which remained pagan, a philosophical and scientific literature developed in classical Syriac. Of this literature, however, nothing has been preserved in the original tongue. Thabit ben Korrah wrote 16 works in Syriac which were highly praised by Bar Hebræus.

Ten thousand Judæans were deported in 597 and settled in or near Nippur. Several thousand more were carried away in 586 and 581. They adopted the Aramaic dialect spoken in Babylonia, and had used it for many centuries when the academies of Sura, Pumbeditha, and Nehardea were established. The discussions concerning the Law and the interpretations of the Tannaim by the scholars in these academies are recorded in the Babylonian Gemara. (See TALMUD.) The text of the Bible and of the Mishna is in Hebrew, the comments of the Babylonian scholars in Aramaic; and the latter covered the period from c.200 to 600 A.D. Differences are perceptible in the language used at various centres of learning. The Jewish incantation bowls found at Nippur show what the popular dialect was c.600 A.D. Even the later Gaonim at Sura still cultivated it, though the Arabic was gaining ground.

Closely allied to Babylonian Talmudic is the dialect spoken by the Mandæans. A number of their sacred books, such as the Ginza, the Qolasta, the Sidra Yahya, and many inscriptions on incantation bowls, have been preserved. (See MANDÆANS.) The Mandæic is important, not only because of the insight it affords us into the peculiarities of the faith of these pagan Gnostics, but also because it exhibits the Aramaic speech of Babylonia uninfluenced by the Bible.

Aramaic is still spoken as a living language in a few places. In the villages of Malula, Bakha, and Jubb Adin, northeast of Damascus, a dialect is used which has a marked resemblance to the Christian Palestinian Aramaic of 13 centuries ago. The Turani spoken by the Jacobites of Tur Abdin, the Fellihi of the Nestorians around Mosul, and the Urmi, which has now, in the hands of the American missionaries at Urmia, developed into a literary language, have been more influenced by the neighboring tongues of Arabs, Kurds, Turks, and Persians. All of these dialects, save possibly that of Urmia, seem to be dying out. See SEMITIC LANGUAGES.

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*dischpalastinischen Aramäisch* (2d ed., Leipzig, 1905); Petermann, *Brevis Linguae Samaritanae Grammatica* (ib., 1867); Nöldeke, *Mandaische Grammatik* (Halle, 1875); id., *Syrische Grammatik* (Leipzig, 1898); id., *Grammatik der neusyrischen Sprache* (ib., 1868); Duval, *Grammaire syriaque* (Paris, 1881); Maclean, *Grammar of Vernacular Syriac* (Cambridge, 1895); *Corpus Inscriptionum Semiticarum*, vol. ii: Littmann, *Semitic Inscriptions* (New York, 1904); Stevenson, *Assyrian and Babylonian Contracts with Aramaic Reference Notes* (ib., 1902). Pognon, *Inscriptions Semitiques* (Paris, 1907); Sachau, *Aramaische Papyri und Ostraka* (Leipzig, 1911); Schiffer, *Die Aramaer* (Leipzig, 1911); Montgomery, *Aramaic Incantation Texts from Nippur* (Philadelphia, 1913).

**AR'AMIN'TA.** A favorite name among the Restoration dramatists, although never given by them to very prepossessing characters. Vanbrugh, in *The Confederacy*, christens with it the wife of Moneytrap, a snobbish creature with a weakness for titles, and Congreve gives it to the principal female character in his comedy of *The Old Bachelor*.

**ARAMIS,** ă'rȧ'mēs'. The least sympathetic of Dumas's *Three Musketeers*, and the one never really loved by the author. His valor and resource were marred by his insincerity. He attains high Church honors, finally becoming the head of the Jesuits.

**ARAN,** ăr'an, SOUTH ISLES OF. Three small islands situated near the entrance to Galway Bay, off the west coast of Ireland. The principal and the most northerly of them is called Inishmore and is 7 miles long and 2 miles broad. The next is called Inishman, and the third, lying to the southeast, Inisheer. Their total area is about 18 square miles, and they all form the barony of Gore. The soil is for the most part sandy, and the only remarkable feature of the islands is the number of antiquities it contains. The islands contained at one time about 20 churches and monasteries. There exist remains of old fortresses, supposed to have been built in the first century A.D. The main industry is fishing, and the principal village is Kilronan, on Inishmore, with a population of 460. Total pop., 1911, 2679. The islands are memorable as the scene of dramas, notably *Riders to the Sea*, by the Irish playwright, J. M. Synge.

**ARANDA,** ȧ-răn'dȧ, DON PEDRO PABLO ABARACA DE BOLEA, COUNT (1718–99). A Spanish statesman, born in Saragossa, of a distinguished Aragonese family. He at first followed a military career, and rose to the rank of general. In 1760 he was appointed by Charles III Ambassador to the court of Augustus III, King of Poland. In 1766 he was recalled to Madrid on account of its disturbed state, and became President of the Council of Castile and Prime Minister. He soon restored order in the capital, expelled the Jesuits from Spain, suppressed the banditti in the Sierra Morena, and promoted a liberal policy. In 1773 he was removed from his post through the influence of the clergy and sent as Ambassador to France, where he remained until 1787. In 1792 he was again made Prime Minister, but was soon deposed through the agency of Godoy, Duke of Alcudia, the Queen's favorite. He remained President of the Council of State, which he had organized; but upon opposing the foreign policy of Godoy he was banished to Aragon, where he died.

**ARANEÆ,** or **AR'ANE'IDA.** An order of Arachnida. See SPIDERS.

**ARANGO Y PARREÑO,** ȧ-răn'gō ē pȧ-rā'nyō, FRANCISCO DE (1765–1837). A Cuban statesman. He was born at Havana, was admitted to the bar in 1789, and twice represented Cuba in the Cortes of Spain. It was through his exertions that the tobacco monopoly was done away with and the ports of Cuba were opened to foreign trade. He is best known for his works treating of Cuban economies, many of which have been translated into other languages. Consult, for biography, the preface of *Obras del Excmo, Señor Don Francisco de Arango y Parreño* (Havana, 1888–89).

**ARANJUEZ,** ă'răn-hwĕth' (from Lat. *Ara Jovis*, altar of Jupiter). A town in the province of Madrid, Spain, situated on the left bank of the Tagus, 28 miles south-southeast of Madrid, in a beautifully wooded valley, 1500 feet above sea level (Map: Spain, D 2). The town is built in the Dutch style and has broad and regular streets intersecting each other at right angles. It is famed for its palace and gardens, the latter in one of the most beautiful parks in the world. The place owes its existence to an idiosyncracy of Philip II. He erected a splendid palace where had been but a shooting villa, and for several months of the year Aranjuez became the seat of government. The place naturally acquired more or less importance from this circumstance, its population at one time reaching 20,000. The various sovereigns who occupied Aranjuez beautified it by erecting new structures or extending the gardens. Aranjuez is known historically for the treaty of alliance concluded here between France and Spain on April 12, 1772, and as the scene of the abdication of Charles IV on March 19, 1808. Agriculture, and especially the raising of horses and mules, are the leading industries. Pop., 1900, 12,670; 1910, 12,175.

**ARANSAS,** ȧ-răn'sas, BAY. An inlet of the Gulf of Mexico, on the coast of Texas, about 15 miles northeast of Corpus Christi Bay (Map: Texas, F 6). It has a length of about 18 miles, and its greatest width is about 8 miles. It is connected with the gulf by a narrow channel, known as Aransas Pass. It has a sandy bar, which detracts from its commercial importance, and is protected by a lighthouse. On Nov. 20, 1864, the pass was the scene of a battle between the Confederate and the Federal troops, which resulted in the capture of the former's fortifications at the pass.

**ARANSAS PASS.** See ARANSAS BAY.

**ARANY,** ŏ'rŏ-ny', JÁNOS (1817–82). Next to Petöfi, the greatest of modern Hungarian poets. He was born at Nagy-Szalonta, March 1, 1817. His parents were simple peasants and very poor, but he was their only son and they spared no effort to give him an education. At four he had already learned to read from letters traced in the ashes on the hearth, and the Psalms were his first spelling book. From the first he was an indefatigable reader and had soon exhausted the resources of the local library, both in Hungarian and in Latin. At the age of 15 he entered the college at Debreczin, where he quickly distinguished himself, but his dreams were of a romantic career. Like Petöfi, he had felt the fascination of the stage, and in 1836 joined a company of strolling players; but after a few months poverty and hunger brought him, footsore and discouraged, back to his father's house. Here he put aside romantic aspirations

and, having obtained an appointment as notary, settled down to a life of routine. It was not until the summer of 1845 that certain absurdities in the life of the county officials "awoke the voice of satire within him" and inspired his first poem, a satirical epic, *Az elveszett alkotmány* ('The Lost Constitution'), and, the Kisfaludy Society of Pesth having offered a prize for the best humorous poem, he submitted it and was successful. Two years later he obtained a second prize with the first part of his great trilogy, *Toldi*, an epic founded wholly upon Magyar traditions, which immediately brought him into widespread popularity and won him the friendship of the leading men of letters of his day and country. Petöfi, among others, wrote to him, saying: "While others win their laurels leaf by leaf, we must grant you at once the full crown." Arany's popularity soon extended to the lowest ranks of the people, for he had saturated himself in childhood with the folklore of his race, and he excelled above all in the art of weaving these old legends and traditions into the fabric of his poems, and in appealing to that spirit of national pride which is a leading characteristic of the Magyar race. From this time on his career was determined. In 1860 he removed to Pesth, becoming first director and then secretary of the Kisfaludy Society, and in 1870 general secretary of the Hungarian Academy of Science, a position which he held until shortly before his death, Oct. 22, 1882. A monument was raised to his memory at Pesth in 1893. Among his more notable works should be mentioned *Murány ostroma* ('The Siege of Murány'); *King Buda's Death*, an epic in 12 cantos; the second and third parts of the *Toldi* cycle, *Toldi's Love* and *Toldi's Evening;* some exquisite ballads, which many Hungarian critics think have been unsurpassed, and numerous translations, including Aristophanes, and portions of Goethe, Tasso, Shakespeare, and Burns. Petöfi is often called the poet of youth, and Arany the poet of mature life. Arany's own estimate of his worth is interesting. "My talent," he wrote, "is always urging me onward, but my lack of energy constantly drags me back; and so I remain, like the greater part of my work—a fragment!" This verdict falls far below that of his countrymen, who unite in regarding him as the poet who raised Hungarian poetry to a hitherto unknown height, as unequaled in his versatility and artistic finish and in his power of combining the spirit of the primitive Magyar folksong and the classic polish of his own verse in perfect harmony. There are numerous German translations of his poems; among others, Kertbeny (Leipzig, 1851); L. Kõrodi (Kronstadt, 1863); Sponer (Leipzig, 1880); and Dux (Pesth, 1861).

**ARA PACIS AUGUSTÆ.** The Altar of Peace was erected by the Roman Senate in the Campus Martius to commemorate the establishment of universal peace by Augustus. The corner-stone was laid July 4, 13 B.C., when Augustus returned from Spain and Gaul, but the monument was not dedicated until Jan. 30, 9 B.C. Fragments of it have been discovered from time to time beneath the Palazzo Ottoboni-Fiano on the Corso; an excavation of the site, begun by the Italian government in 1903, was never finished. The altar stood in an oblong court, 31 × 27½ feet, surrounded by a wall 21 feet high, with a wide door in each of the long sides. All the extant fragments of sculpture in relief are from this wall, which bore as its principal decoration a series of beautiful panels occupying the upper portion of the outer face. Interest attaches chiefly to two friezes, each of which represents a group of men, women, and children about to take part in a sacrifice; as the faces are highly individualized, it is fairly certain that they are portraits from life, and many scholars hold that one frieze represents members of the imperial family. In technique these sculptures give us the high-water mark of Roman achievement.

**ARAP'AHO** (probably, tattooed people). An important Algonquian tribe of the North American plains, living in three principal divisions, viz., the Hitunena, 'Beggars' or Gros Ventres, associated with the Assiniboin in northern Montana (600); the northern Arapahos, living with the Shoshones upon a reservation in Wyoming (800); and the southern Arapahos, associated with the Cheyennes in Oklahoma (980). These last, together with the Cheyennes, sold their reservation by treaty in 1892, and are now citizens, holding allotments in severalty. In character the Arapahos are friendly and accommodating and display a superior adaptability to civilization. They are also of a fervent religious spirit and were among the principal adherents and propagators of the ghost-dance religion in the winter of 1890. In the early border wars they were usually friendly or neutral, notwithstanding the fact that their allies, the Cheyennes, were among the most determined of the hostiles. Consult Kroeber, *The Arapaho* (New York, 1904).

**ARAPAIMA,** ä'rà-pī'mà (probably native name). A genus of South American river fishes, closely related to the herrings, and having the body covered with a mosaic of strong, bony, compound scales. They are the largest fresh-water fishes in the world, attaining a length of 15 feet and a weight of 400 pounds. They are much valued as food, both in the fresh and in the salted condition, by the people of Brazil and Guiana. The principal species is *Arapaima gigas*, which is taken by spearing.

**ARAPILES,** ä'rà-pē'lās. A village of Spain in the province of Salamanca, situated about 4 miles southeast of the town of Salamanca (Map: Spain, C 2). It was famous as the place of the battle of Salamanca, in which the French forces under Marmont were defeated by the allied troops under Wellington, on July 22, 1812. Pop., 1910, 543.

**ARARAT** (*Ararat*, in the old Armenian dialect *Aiarat*, i.e., the plains of the Aryans). The ancient name of the fertile plateau through which flows the river Aras, or Araxes. Ararat appears in the Old Testament (2 Kings xix. 37) as the place to which the sons of Sennacherib fled after murdering their father. In Assyrian texts the country is also mentioned frequently from the ninth century B.C. onward under the form Urarti, though it would appear that the name was used somewhat indefinitely for a larger district than the Ararat of classical writers. It was the ambition of the Assyrian kings to include Urarti in their dominions, and frequently military expeditions were made against *Nairi*, as the vast tract to the north and northeast of Assyria was commonly termed, or the land of the Chaldi. (See CHALDÆANS.) It occupies the centre of the mountainous region of Armenia, belonging partly to Turkey and partly to Russia. According to Genesis (viii. 4), it

was on the "mountains of Ararat" that Noah's Ark rested after the Deluge, from which it appears that Ararat was properly the designation of an entire district. Such, however, was the general interest in the biblical tradition that the name "Ararat" became attached to a particular mountain, the one called by the Armenians *Masis Lcusar*, or 'mountains of the ark'; by the Turks *Aghri-Dagh*, 'steep mountain'; and by the Persians, *Koh-i-Nuh*, 'Noah's mountain.' It rises in two volcanic cones, known as the Great Ararat and the Little Ararat; the former, which attains the height of 16,912 feet (according to another measurement, 17,212 feet) above sea level, is covered with perpetual snow. The latter rises to a height of 12,840 feet. Mount Ararat is, next to Mount Demavend, the highest elevation of western Asia, and since 1827 it forms the point where the Russian, Turkish, and Persian territories meet, its summit being in Russian territory. In 1840 the form of the mountain was partially changed by a frightful and destructive earthquake. Previous to this period, at the base of the mountain and at a point where a stream runs from a wild gorge, there stood the village of Arguri, or Aguri. It was surrounded by gardens and orchards and had upwards of 1000 inhabitants. In the ravine, 2300 feet above the village, stood the Armenian convent of St. James. The beauty and mild air of the district made Arguri a favorite summer resort of the richer inhabitants of Armenia. It was destined to undergo a great change, however. On July 2, 1840, dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, the ravine was closed, the convent and chapel disappeared, and the village and the gardens which surrounded it were buried under rocks, earth, and ice, with all the inhabitants. The mountain was climbed by Dr. Perrot of Dorpat in 1829, and since then by many others. Consult: J. J. Perrot, *Reise zum Ararat* (1839); D. N. Freshfield, *Travels in the Central Caucasus and Bashan* (1869); J. Bryce, *Transcaucasia and Ararat* (1896); H. B. Lynch, *Armenia* (1911).

**ARARAT,** or **PI'LOT MOUN'TAIN.** A mountain about 3000 feet high, situated in Surry Co., N. C.

**ARARIPE,** ä'rä-rē'pā, SERRA. A low mountain chain forming the southwestern boundary of the states of Ceará and Piauhy, Brazil (Map: Brazil, J 5). It forms part of the mountain system that extends southward from the northeast coast at a point just to the west of the mouth of the Parahiba River. It is, besides, the watershed between that river system and the São Francisco, to the eastward.

**ARARO'BA POWDER,** or GOA POWDER (q.v.). A substance found deposited in the wood of *Andira araroba*, a Brazilian tree. From Goa powder is extracted a drug, chrysarobin (q.v.), used in medicine as a stimulant in chronic skin diseases, especially psoriasis, and as a parasiticide in ringworm. It is a pale orange-yellow, finely crystalline powder, odorless and tasteless, or slightly bitter.

**ARAS,** ä-räs' (the ancient Gk. *Ἀράξης, Araxēs*). A river in Caucasia, formed by the junction of the Bingol-Su and the Kaleh-Su, and formerly uniting its waters with those of the Kura (ancient *Cyrus*), at Zhevad, after a course of about 500 miles, but since 1897 it has resumed an ancient course, from near Karadonly, to the Bay of Kizil-agach of the Caspian, almost paralleling for this distance the Kura through which its waters flowed before. In the time of Strabo these rivers were separated in this manner, and they had been united, for their lower course, only in comparatively modern times. The old bed was visible at places, and on an island once stood an old capital of Armenia, Artaxata. The main stream is the Bingol-Su, which rises in the Bingol-Dagh Mountains, Asiatic Turkey, in lat. 41° 30′ N. and long. 41° 10′ E. and, flowing north-northeast, is joined a little below Hasan-Kaleh by the Kaleh-Su, after which the combined stream is called the Aras (Map: Turkey in Asia, M 3). About 52 miles west of Kazyman it crosses the Russian frontier, traverses the territory of Kars and the government of Erivan; then forms for a long distance the boundary line between Russia and Persia. On its banks are found many traces of ancient canals and other proofs that the surrounding country was once densely populated.

**ARA'TOR.** A Christian Latin poet of the sixth century. He was born in Liguria, studied at Milan, became a jurist under Theodoric, and was an official under Athalaric, Theodoric's successor. About 540 he took orders as a subdeacon of the Roman church. He is best known for his *De Actis Apostolorum*, a poem in very creditable hexameters, but much overweighted with reflective and allegorical passages. He also wrote an *Epistola ad Parthenium* in the elegiac distich. Consult Max. Manitius, *Geschichte der christlich-lateinischen Poesie* (Stuttgart, 1891).

**ARA'TUS** (Gk. *Ἄρατος, Aratos*) (271–213 B.C.). A distinguished statesman and general of Sicyon. At the time of Aratus's youth Sicyon was in the hands of tyrants, who were chiefly partisans of the Macedonian kings. Clinias, the father of Aratus, was an active supporter of the opposite side, and in the course of a party struggle was assassinated (264). Many members of his party were obliged to flee from the city, and Aratus was rescued by a relative and taken to Argos. Here he spent his youth and, through his strength of body and of mind, became a recognized leader of the exiled band. In his twentieth year (251), putting himself at the head of a few followers, he made his way to Sicyon, secretly entered the town, drove out the tyrant, and reëstablished a government of the people. Owing to the long rule of the tyrants, he at first met with many difficulties in his efforts at reorganization, but he successfully overcame these and was recognized as the first man in the state. Under his lead Sicyon joined the Achæan League, in which it soon rose to a position of first importance. In 245 he was made general of the league, an office which he held in the course of his career 17 times. Through his influence many other Greek cities joined the confederacy. In 224 the league was hard pressed by the Spartans under Cleomenes, and Aratus found himself obliged to join hands with Antigonus, King of Macedonia. An alliance was made, and the Spartans were defeated at Sellasia, in 221; but through this step the Macedonians gained a foothold in Peloponnesus. Aratus was greater as a statesman than as a general, but he was sincere throughout his life in his efforts to enlarge and strengthen the league. He was finally poisoned, in 213, by order of Philip, the successor of Antigonus. Two annual festivals (the Aratea) were instituted by his countrymen in his honor. Near the end of his life he wrote his memoirs, in 30 books. Consult Müller,

*Fragmenta Historicorum Græcorum* (Paris, 1868–74).

**ARATUS** OF SOLI. A Greek physician and poet of Cilicia. About 270 B.C., at the request of the Macedonian King, Antigonus Gonatas, he wrote a Greek didactic poem, entitled *Phænomena*, founded on the astronomical system of Eudoxus, of Cnidos, and appended to it another poem, *Diosemeia*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, which were translated into Latin by Varro, Cicero, Cæsar Germanicus, and Rufus Festus Avienus. In his *Georgics* Vergil was somewhat indebted to Aratus for material. Aratus was a native of the same province as St. Paul, who quotes from him in his speech on Mars Hill (Acts xvii. 28). Critical edition by Maass (Berlin, 1892).

**ARAU'CAN, or AR'AUCA'NIAN STOCK.** An important South American Indian people, calling themselves *Mapu-che* ('people of the land') and their language *Chilidugu*. Their territory included at one time the whole of modern Chile, which overflows beyond the Andes, some bands straggling as far as Buenos Ayres, and latterly southward over the Argentinian Pampas. The Chilean Araucanians number some 70,000, and much intermixture with the Spanish population has taken place. The Araucanians were rather loosely organized, but a warlike and independent race. The story of their heroic resistance to the European invaders has been told in verse in A. de Ercilla's famous epic *La Araucana*, and in prose by T. Guevara, *Historia de la Civilización de Araucaniá* (3 vols., Santiago, 1898–1905). They still show themselves hostile to many aspects of foreign culture, Christianity in particular. To the Araucanian (the *Aucan* of Brinton) stock belong the Picunche ('people of the north'), Pehuenche ('piñon people'), Huilliche ('people of the south'), Moluche ('people of the east'), or Manzañeros ('crabapple people'), Ranqueles (at the source of the Rio Chalileo), etc. The Puelche, Chono, and Tehuelche are entirely separate peoples, and not Araucanian. Consult Lenz, *Estudios Araucanos* (Santiago, 1895–97), the writings of Guevara, Latcham, Medina, Schuller, etc.

**ARAUCANIA,** ä'rou-kä'nē-à. The country of the Araucos or Araucanian Indians, a territory in the southern part of Chile, occupying portions of the provinces of Arauco, Bio-Bio, Cautin, and Malleco. The country is divided from north to south into four parallel regions, which were formerly administered by hereditary *toguis*, or hereditary princes. The total number of Araucanians cannot be given with accuracy, but in 1907 it was estimated at 101,000. In physical type they resemble their kindred of the pampas. Their language is of such harmonious and adaptable character that a serious attempt was once made by a missionary student to introduce it into Europe to supersede Latin. The Araucanians remained independent longer than any other native tribe on the American continent and fought for their liberty, with intervals of precarious truce, from 1537 to 1773. During the war between Spain and the Chilean colonists, Araucania remained neutral. In 1861 a French adventurer named Antoine Tounens was elected King of Araucania, under the name of Orélie Antoine I, but was deposed and sent back to France by the Chilean government. The rule of Chile was recognized by the Araucanians in 1870. Consult A. Polakowsky, "Die heutigen Aurakamen" in *Globus*, No. 74. (Brunswick, 1898.)

**AR'AUCA'RIA** (from *Araucania*, a territory in the south of Chile). A genus of plants of the family Pinaceæ, or pines, consisting of lofty trees, natives of South America and Australasia. The species, of which there are 15, are all evergreen. The leaves are broader than those of pines and firs, which, however, the trees resemble in their general manner of growth. *Araucaria imbricata*, sometimes called the Chile pine, a native of the Andes of Chile, forming forests on their western declivities, attains a height of 150 feet. Its trunk is quite straight and free from knots. The bark of the young trees is studded with leaves from the base upward, even until the tree is 12 or 15 years of age. The branches are in whorls of 5 to 8. Young trees have branches almost from the ground; old trees have tall naked stems, with a crown of branches. The female strobile (cone) is roundish ovate, 6 to 8 inches in diameter, with scales terminated by a long awl-shaped point, and seeds wedge-shaped and more than an inch in length. The outer and inner bark of full-grown trees are each 4 to 6 inches in thickness. From both outer and inner bark, and indeed from all parts of the tree, resin flows readily and in great abundance. The leaves are lanceolate, about an inch in length, and half an inch in breadth near the base, sharp-pointed. The timber is heavy, solid, hard, fibrous, yellowish-white, and beautifully veined. It is suitable for masts of ships. The resin, which is white, has a smell like frankincense and a not unpleasant taste. The seed is pleasant to the taste, not unlike the chestnut, and is a most important article of food among the natives. It is eaten raw, boiled, or roasted. A spirituous liquor is distilled from it. A single strobile sometimes contains between 200 and 300 seeds, and one tree may be seen loaded with 20 or 30 of these great strobiles. This Araucaria was introduced into Great Britain at the end of the eighteenth century and is now pretty frequently planted. *Araucaria brasiliana*, the Brazil pine, has loosely imbricated lanceolate leaves and a looser and more spreading habit than *Araucaria imbricata*. The seeds or nuts are sold as an article of food in Rio Janeiro. The resin which exudes from the tree is mixed with wax to make candles. *Araucaria excelsa*, the Norfolk Island pine, a native of Norfolk Island, New Caledonia, etc., attains a height of 160 to 220 feet, free from branches to 80 to 100 feet, with a trunk sometimes 11 feet in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. The leaves of the young trees are linear and spreading; those of the adult are ovate and closely imbricated. The cones are 4 to 5 inches in diameter, nearly globular. *Araucaria cunninghamii*, the Moreton Bay pine, a native of the shores of Moreton Bay and banks of the Brisbane River in Queensland, very much resembles the last. It attains a height of 150 to 200 feet, and a diameter of 3 to 6 feet. The leaves of the adult trees are lanceolate and imbricated. The wood is yellowish and is used for boat building, house carpentry, and the common kinds of furniture. *Araucaria bidwillii*, the Bunya Bunya, is an important tree of Queensland, where it attains a height of 100 to 150 feet and a diameter of 3 to 4 feet. The timber is not quite so valuable as that of the Moreton Bay pine. The seeds, of which there is said to be

an abundance every three years, are as much as 2 inches long and three-quarters of an inch broad, and are much used for food by the aborigines. An important resin is obtained from this tree.

There are a number of species and varieties grown in greenhouses in the United States, where they are prized for their graceful appearance. This is especially true of *Araucaria excelsa*. The species do not flourish in the open, except in the southern States. Nearly all the leading species are successfully grown as ornamentals in California. See Plate ASH AND ARAUCANIA.

**Fossil Forms.** Araucaria, and several allied genera, have been found abundantly in rocks of Mesozoic and Tertiary ages in nearly all parts of the world. The oldest representative of the group is the genus *Walchia*, which occurs in rocks of Permian or uppermost Carboniferous age, and which grew to a great size, equaling that of the tallest spruces of modern times. Throughout Mesozoic rocks of America, Europe, and Asia, the genus *Araucaria* and its allies have been widely recognized by their leaves, branches, fruits, and in some cases by even large trunks. The type genus *Araucaria* appears first in rocks of Lower Jurassic Age; it reached a considerable degree of expansion in Cretaceous time all over northern Europe and Greenland, and at the end of the Eocene Tertiary it became extinct over that region, probably because of climatic changes which forced it to migrate farther to the southward. It will hence be seen that the modern representatives of this genus are mere relics of a once extensive group of plants which in those earlier times furnished the great forest trees that covered a large part of Europe and Asia, and to a lesser degree portions also of the American continent.

Consult: F. von Mueller, *Select Extra-Tropical Plants Readily Eligible for Industrial Culture* (Melbourne, 1895); G. Bentham, *Flora Australiensis* (London, 1863–78); G. Nicholson, *Illustrated Dictionary of Gardening* (London, 1888); L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900–01).

**ARAUCO,** ä-rou'kō. A province of Chile, bounded by the provinces of Concepción, Bio-Bio, Malleco, and Cantin, and the Pacific Ocean (Map: Chile, C 11). Its area is 2457 square miles. It has a fertile soil and contains some coal. There are extensive forests, and cattle-raising is an important industry. The population in 1910 was 62,250. Capital, Lebu, with a population of about 3500. See ARAUCANIA.

**ARAUJO DE AZEVEDO,** ä-rou'zhō dā ä'zā-vū'dō, ANTONIO DE (Conde da Barca) (1754–1817). A Portuguese statesman and diplomatist born at Sa, near Ponte de Lima. In 1789 he was appointed Ambassador to The Hague. In 1797 he negotiated at Paris a treaty with France, but it was rejected by the Directory. A few months later he went as Ambassador to Berlin. After the Peace of Amiens he served as Ambassador to St. Petersburg. In 1803 he was recalled to Lisbon, to assume the office of Minister of Foreign Affairs. As head of the state he did much for its material advancement; but with the capture of Lisbon by Napoleon and the dethronement of the royal family in 1807, he accompanied the court to Brazil. During the first years of his residence in the New World he devoted himself to scientific and literary pursuits. He founded at Rio de Janeiro a school of fine arts and one of medicine and chemistry. He introduced the cultivation of tea and in many ways encouraged agriculture and industries. In 1814 he was Minister of Marine for the colonies of Brazil, and the next year received the title of the Count of Barca. At his death he was Minister of Foreign Affairs. Among his literary works were two tragedies, and translations from Horace, Gray, and Dryden. He died in Rio de Janeiro.

**ARAUJO PORTO-ALEGRE,** pōr'tō ä-lā'grā, MANOEL DE (1806–79). A Brazilian architect and poet. He was born at Rio Pardo, in the province of São Pedro, studied art at Rio de Janeiro, and art and architecture in Paris and Italy, and in 1837 was appointed professor in the Academy of Art at Rio de Janeiro. He was appointed consul general at Stettin in 1859. He designed the church of Santa Ana and the Rio Bank, wrote a number of moderately successful comedies, *Colombo* (an uncompleted epic), and a volume of poems entitled *Brasilianas* (1863).

**ARAUNA,** ä-rou'nä. A South American tribe of Tacanan stock, living along the Madre de Dios, a northern tributary of the Beni River, on the Peru-Bolivia frontier. Although evidently of considerable importance, contemporary accounts concerning them differ radically, Heath (1883) asserting that they are naked cannibals, ugly and ill-formed, while Labre (1885) describes them as sedentary agriculturists, and Armentia (1887) says that they are gentle and friendly and of remarkably light complexion. According to Labre, also, they have temples with images of wood and polished stone, and hold women so impure as to exclude them from religious rites and not even to permit them to know the names of the gods. See TACANA.

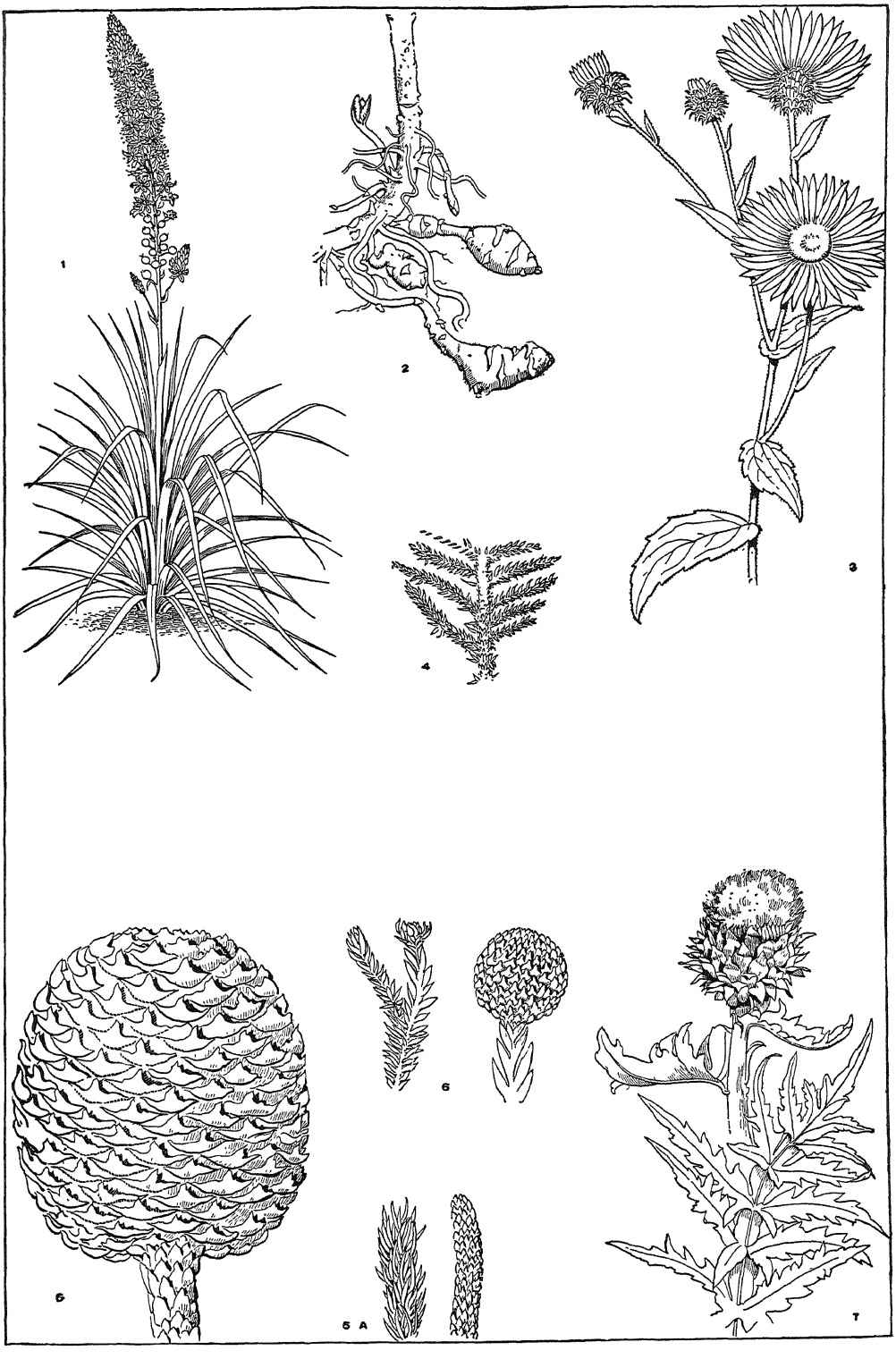
**ARAURE,** ä-rou'rā. A town in the state of Lara, Venezuela, on the Acarigua River, 20 miles south of Barquisimeto (Map: Venezuela, D 2). The surrounding region is noted for its fertility in the production of cotton, coffee, and cattle, while near by is the scene of the battle of Araure, Dec. 4, 1813. Population, 4000.

**ARAVALLI,** ä-rä'vū-lē. A mountain range in Rajputana, British India, extending from about lat. 22° 40′ N., long. 74° E., to lat. 26° 50′ N., long. 75° E. (Map: India, B 3). It is about 300 miles long, with a width ranging from 6 to 60 miles. The river system of the Aravalli mountains is very extensive, especially on the north and south slopes. The vegetation is poor, and the valleys inclosed between the hills are mostly sandy and utterly devoid of vegetation.

**ARAWAK,** ä'rä-wäk. A tribe living on the Corentyn River in Dutch Guiana, from which the great Arawakan stock (q.v.) derives its name. The word signifies 'meal eaters,' in allusion to cassava bread, which forms a principal article of diet with the tribe (they call themselves simply *lukkunu*, i.e., 'men'). The Arawak cultivate both cassava and corn, but depend largely also on hunting and fishing. They have the clan system, with descent in the female line, and practice the couvade.

**ARAWAKAN, STOCK.** The most widely extended linguistic stock of South America, its tribes formerly reaching, with interruptions, from southern Brazil and Bolivia to the northernmost extremity of the continent, and including also, until the irruption of the Caribs, the whole of the West Indies, several villages being even established upon the mainland of Florida. Columbus made his first landing and

# ARAUCARIA




1. ASPHODEL (Asphodelus albus).
2. JERUSALEM ARTICHOKE (Helianthus tuberosus), showing tubers.
3. A WESTERN ASTER (Aster townsendii).
4. A FOSSIL SPECIES OF NORFOLK PINE (Araucaria).
5. NORFOLK PINE (Araucaria excelsa).
5A. TIPS OF BRANCHES OF NORFOLK PINE.
6. CONE AND BRANCH OF A FOSSIL ARAUCARIA.
7. GLOBE ARTICHOKE (Cynara scolymus).

earliest discoveries in Arawakan territory, and the names preserved from Haiti, Cuba, and the Bahamas are readily explained from the existing dialects of this stock. The Arawakan tribes were pressed upon by the Caribs from the lower Orinoco, and these fierce invaders had already seized many of the southern Antilles at the time of the discovery, the occupation being then so recent that the women of the island Caribs, most of whom were Arawak captives, still spoke that language. Physically, the Arawakan tribes are rather undersized, with apparently low vitality. They include several different types. Their plane of culture is rather above that of their neighbors. Those of the islands cultivated corn, manioc, and cotton, as well as tobacco, which came first to European knowledge through them. They were skillful weavers and artisans in wood, stone, and native gold. Considerable study has been made of the mythologies of the stock. Of more than a hundred existing Arawakan tribes, the most important are the Anti, Arawak, Baniva, Baré, Baure, Goajiro, Guaná, Manaos, Maneteneri, Maipure, Marauha, Moxo, Passé, Piro, Taruma, Wapisiana. In their recent studies of the languages of Ecuador, northern Peru, Bolivia, northwest Brazil, and southern Colombia, Rivet and Beuchat seek to extend very much the original territory occupied by the Arawakan stock. Consult recent writings of Rivet and Beuchat, Chamberlain, Koch-Grünberg, M. Schmidt, K. von den Steinen, etc., particularly Koch-Grünberg's *Die Aruak-Sprachen Nordwestbrasiliens* (Vienna, 1911), and a list and discussion of the tribes of the Arawakan stock by Chamberlain in the *Journ. de la Soc. d'Amér. de Paris.*

**ARAXES,** ȧ-răk'sēz. See ARAS.

**ARAYAT,** ȧ-rī'ȧt. A town of Luzon, Philippines, in the province of Pampanga, about 12 miles northeast of Bacolor (Map: Luzon, E 6). It was occupied by American troops under General Young on Oct. 12, 1899, during the Filipino insurrection. Near by, in the fork, and at the junction of the Grande and the Chico de la Pampanga rivers, is an extinct volcanic cone 3564 feet high. Pop., 1903, 12,904.

**ARBACES,** ärʹbȧ-sēz (Gk. *Ἀρβάκης, Arbakēs*). According to Ktesias, a general of Sardanapalus, King of Assyria, who in connection with Belesys, commanding the Babylonian troops, organized a conspiracy against Assyria, and after defeating Sardanapalus founded the Median Empire, establishing a dynasty that lasted until its overthrow by Cyrus. Sardanapalus is Asurbanipal (668–625 B.C.), after whose death Cyaxaras of Media and Nabopolassar of Babylonia made their first attack upon Nineveh, which was frustrated by the aid of Madyas, Protothyas's son, the Scythian King. Ktesias seems to have confused Asurbanipal with Sinsariskun, who was overthrown by the two allies (c.606 B.C.). Since he identifies Astyages, whose kingdom was taken by Cyrus in 550 B.C. with Aspadas, it is possible that Artæus, Artynes, and Astibaras represent the private names of the predecessors of Astyages, Deioces, Phraortes, and Cyaxares, while the first five names in his list are those of rulers over the petty Median principality whence Deioces came. There seems to be, in his account, a confused memory of the first struggles between Median princes and Shalmaneser III (860–825 B.C.) and the advance of a united Media upon Assyria after Elam's fall (c.640 B.C.) leading to the destruction of this great power. See MEDIA.

**ARBACES.** 1. The King of Iberia in Beaumont and Fletcher's *King and No King.* 2. The ruler of Media in Byron's *Sardanapalus.*

**ARʹBALEST** (Lat. *arcus,* bow + *ballista,* a military engine, from Gk. *βάλλειν, ballein,* to throw), ARBALIST, ARCUBALIST, ARBLAST. A weapon of indefinite antiquity, known also as crossbow or bow-gun. Some Roman forms are depicted on extant monuments, and it was from the Romans, possibly indirectly, that the arbalest in use in the Middle Ages was derived. It was employed chiefly in the twelfth century and later, although it was not unknown in the tenth and eleventh centuries. There were at least eight distinct forms, varying in size and construction. Some were carried by foot soldiers, others were permanently fixed on fortifications like modern cannons; some hurled short, thick arrows (called "quarrels," or bolts); others shot stones, leaden balls, or other projectiles. The larger ones were worked by placing the foot in a loop, drawing the cords up with the hands, while the gun was maintained in an inverted position. When the weapon became so improved that the bow was made of steel, it required, in order to bend it, a separate machine called a "moulinet." In the crude formations of mediæval tactics the arbalestiers, or crossbowmen, were an important branch, and were usually advanced to the first line of battle. They were divided into two branches, the mounted and unmounted, and their supplies of arrow ammunition were carried in carts. The use of the arbalest against Christians was prohibited by the Lateran Council of 1139 on the ground that it was "a thoroughly diabolical weapon." But this prohibition was ineffective. Richard the Lion-Hearted was noted for his skill with the arbalest. One clause of the Magna Charta prohibited King John from employing foreign crossbowmen. In the fourteenth century the arbalest was superseded in England, to a great extent, by the longbow. See ARCHERY.

**ARBEʹLA** (Gk. *Ἀρβηλα,* Assyr. *Arbailu,* the city of four gods, from *arba,* four + *il,* god). An ancient town of Assyria, now the Turkish town of Erbil or Arbil, situated in lat. 36° 9′ N., long. 44° 4′ E., to the southwest of Mosul. It is famous as having given name to the battle in which Alexander the Great finally defeated Darius, 331 B.C. The battle was really fought near Gaugamela, some 70 miles to the northwest of Arbela. See ALEXANDER THE GREAT.

**ARʹBER,** EDWARD (?—). An English scholar, Fellow of King's College, London, and emeritus professor of English literature in Mason College, Birmingham. To him English scholarship is greatly indebted for 30 careful reprints. They comprise *Tyndale's New Testament, 1525* (1871); *A Transcript of the Registers of the Company of Stationers of London, 1554–1640* (1875); *English Reprints* (14 vols., 1868–71); *An English Garner* (8 vols., 1877–96); *An English Scholar's Library* (16 nos., 1878–84); *British Anthologies* (10 vols., 1899–1900); *The First Three English Books on America* (1885); *The Story of the Pilgrim Fathers, 1606–23* (1897); *British Anthologies* (1899–1901); *A Christian Library* (1907).

**ARBITRAGE,** ärʹbĭ-träj *or* ärʹbĭ-träzhʹ (Lat. *arbiter,* umpire, judge). A term applied to transactions which take advantage of differences of prices for the same articles in different markets. At the same time that the trader buys in the cheaper market, he sells in the dearer. The margin between the two prices must be suffi-

cient to do more than cover the costs of exchange to insure a profit. The rate of profit is of necessity small, being frequently measured in small fractions of 1 per cent. The objects of such arbitrage transactions may be bullion or coin, bills and exchanges, or stocks and bonds.

**AR'BITRA'TION** (Lat. *arbitratio*, judgment, from *arbiter*, umpire, judge). The submission of a dispute, which might otherwise be the subject matter of a civil litigation, to the decision of a private person instead of a court of justice. This is not permitted in criminal cases; nor are the parties to a civil dispute necessarily bound by an agreement to arbitrate, even though the agreement be upon a valuable consideration. At common law, contracts for the adjustment and settlement by arbitration of all disputes and differences between the contracting parties are not treated as binding so as to oust the jurisdiction of the courts. For example, if a landowner grants to another the privilege of laying waterpipes across certain land, in consideration of the latter's payment of a specified sum and of his agreement to pay all damages caused by the breaking or leaking of the pipe, a stipulation that the damages shall be fixed by arbitration is not enforceable. The landowner can maintain an action at law for any damages so caused and refuse to abide by his agreement to arbitrate them. This, it has been judicially declared, both in England and the United States, rests "upon the general policy of the law, that parties cannot enter into a contract which gives rise to a right of action for the breach of it and then withdraw such a case from the jurisdiction of the ordinary tribunals." On the other hand, if a property owner and an insurer enter into an agreement that the former shall pay a certain premium, in consideration of which the latter, upon the destruction of the property, shall pay the former such a sum of money as shall be settled and ascertained by arbitration, the contract is binding in all of its provisions, and the insured has no cause of action until an arbitration has been had, or it has been prevented or dispensed with by the insurer. The legal distinction between these two classes of cases is well established, but it is not always easy to determine within which class a particular controversy falls. If it falls within the first class, either party has the power to revoke the arbitration, even after his submission of the dispute to the arbitrator; although by so doing he subjects himself to an action for damages for breach of contract, if his agreement to arbitrate was upon a valuable consideration.

This power of revoking a submission has been modified by statute in England and in many American jurisdictions. It is provided, in some of our State constitutions, that the legislature shall enact laws providing for arbitration or shall establish courts of conciliation. The tendency of modern statutes is to extend the limits of private arbitration, to conform the proceedings therein, so far as practicable, to those of a court or an official referee, and to give to an award of arbitrators the force and effect of a judicial decision. In the absence of legislation, however, a judgment cannot be entered on an award, nor can the determination of an arbitrator be enforced by execution. If the defeated party refuses to carry out the award, his opponent must sue upon it. There is no appeal from an award, as there is from the decision of an inferior court; but it may be corrected in some cases, and it may be set aside for various reasons, such as fraud practiced by the prevailing party, or misconduct on the part of the arbitrators, or their failure to conform to the terms of the submission. As a rule, however, an award will not be set aside for purely technical or formal defects. Unless some flagrant error in the proceedings is disclosed, courts are disposed to uphold an award in an arbitration to which the parties have assented, and on which they have been fairly heard. Consult: Morse, *Law of Arbitration and Award* (Boston, 1872); Russell, *A Treatise on the Power and Duty of an Arbitrator and the Law of Submissions and Awards* (8th ed., London, 1900).

**ARBITRATION,** INTERNATIONAL. The settlement of disputes between states by judges of their own choosing and in conformity with their respective rights. Arbitration tribunals may be special or general, temporary or permanent, restricted or open. It is essential that the contracting states formally agree to refer their differences to an independent tribunal and bind themselves to abide by its award. The persons or states chosen as arbitrators should formally accord their consent and accept the obligation. The reference is usually made by special agreement signed on behalf of the contending parties, stating the questions to be submitted, summarizing the points of law or fact involved, defining the limits of the arbitration, and in cases indicating the course of procedure. In case the matters in dispute are of vital importance, their arbitration is usually based upon a special treaty, sanctioned by the legislative body to which the treaty-making power is intrusted—in the United States, the Senate. In case of mere financial claims of private citizens of one state against another, arbitration may be based upon mere executive agreements. In many cases an agreement is reached in advance by the executives of the countries concerned that some pecuniary damages shall be paid: the only question remaining for decision being the amount of damages. The tribunals appointed to determine this question are usually made up of representatives of the two nations involved, although representation of disinterested nations may be employed. Under The Hague convention of 1899 provision is made that in case of questions in dispute affecting neither the vital interests nor the honor of the nations involved in controversy, international commissions of inquiry shall be appointed to examine and report upon the local circumstances. Such commissions have no power of making decisions, but their reports may serve as the basis either of direct diplomatic settlement of disputes or of formal arbitration. Such a commission was appointed in 1904 under agreement between Great Britain and Russia, to inquire into the questions arising from the firing upon British trawlers in the North Sea by the Russian fleet. All its findings were accepted by the two powers. In 1913 it was proposed by the United States Secretary of State to the diplomatic representatives of foreign powers at Washington that the principle of international commissions of inquiry be extended to all questions whatsoever, and that the Powers bind themselves not to declare war or begin hostilities pending the investigation of such a commission.

Arbitration is largely an outgrowth of relations between jurisdictions independent politically, but closely interdependent in respect to religion, culture, and economic interests, between

jurisdictions in the same plane of civilization, and the consequent development and recognition of international duties and liabilities. The attitude of Greek civilization toward the barbarian world rendered conciliation with non-Greeks impossible; among the Greeks themselves, however, arbitration was freely employed. Questions relating to religion, commerce, and boundaries were frequently submitted to arbitrators, and in some cases treaties of alliance made express provision for arbitration of all disputes. The foreign policy of Rome, contemplating universal conquest, precluded the employment of arbitration. During the Middle Ages arbitrations again became frequent. The breakdown of the Roman Empire had destroyed political unity; the growth of the Church had reconstituted the cultural unity essential to arbitration. The predominance of the popes, as delegates of God, constituted them the natural judges of all international causes, and brought to their tribunal many of the differences between kings and peoples. Some of the treaties of mediæval times stipulated that all disputes should be referred for settlement to the Pope, and that excommunication should be the penalty for failure to accept his decision. The great prelates were often chosen as voluntary arbitrators, though perhaps oftener on occasions involving private interest and internal policy than on those of actual international conflict. One of the most celebrated of arbitration decisions is that of Pope Alexander VI, tracing an imaginary line from pole to pole in his division of all lands discovered in the New World between Spain and Portugal. Even after the decline of papal supremacy, Gregory XV acted as arbitrator of the question of the "Valtelline" forts in the seventeenth century, and Pope Clement XI gave the casting vote as umpire between Louis XIV and Leopold I, the chosen arbitrators by Article 8 of the Treaty of Ryswick. Under the feudal system vassals were naturally predisposed to look to their lords for the determination of their conflicting claims. The efforts of the emperors of the Holy Roman Empire to succeed to the position of the popes in this regard resulted in an occasional recognition of their jurisdiction—never of their supremacy. With the establishment of absolute monarchies, and the religious schisms of the Reformation Period, arbitration declined.

The change in international relations produced by modern means of transportation, with the resultant complex social and political intercourse and the vast economic loss involved in modern war, has tended more and more to the employment of the method of arbitration in international disputes, and its gradual recognition as the most humane, economical, and enduring method for their determination. The questions submitted involve not only the adjustment of claims relating to the rights of nations as between themselves, but also those of individuals against foreign governments. During the nineteenth century there were over 130 important arbitrations, and almost as many more minor commissions for the settlement of purely financial claims. Both in the numbers and the questions involved the United States and Great Britain have unquestionably led the way. The most important of these is the Treaty of Washington (q.v.), of which one article instituted a Joint High Commission, which at Geneva in 1871 determined the questions relating to the *Alabama* Claims (q.v.). Hardly inferior in numbers or importance have been the arbitrations between states of Latin America. In both cases the conditions of arbitration, as described above, have been fully met: essential identity of culture, despite political independence. As a result of the increasing cultural homogeneity of the world at large, the possible field of arbitration is becoming world-wide.

Disputes that may arise between nations fall into three general classes: (1) those which involve the national independence, the vital national interests, or the national honor; (2) those which concern the interpretation of treaties between nations; (3) those involving financial claims of citizens of one nation against the government of another. It is generally admitted that the graver questions under (1) are not susceptible of arbitration. It would have been impossible to induce the Boers to submit to arbitration the question at issue between themselves and Great Britain—the independence of the Boer republics. In general treaties of arbitration it is customary to exclude such questions from the scope of arbitration. The second class of questions is normally disposed of by arbitration, and the third, which accounts for four-fifths of all international disputes, is now universally handled through arbitral tribunals, in so far as they cannot be settled through ordinary diplomatic negotiations.

There are no general principles that will determine, in all cases, whether the national independence, vital interests, or honor is involved in a dispute. The Hague convention in 1899 left the determination of this question to each nation, and this manifestly leaves many opportunities for rupture of international relations. The current tendency appears to be in the direction of narrowing the range of non-arbitrable questions. The *Alabama* Claims settlement is especially significant as extending the range of arbitration. It is to be borne in mind that for many years Great Britain refused to submit the claims to arbitration, on the ground that the national honor was involved.

Arbitration may be based upon a special treaty or convention, or upon a general treaty covering all cases of a given kind. General arbitration treaties are especially common in Latin America. Such treaties have been concluded between Great Britain and France (1903); France and Italy, Great Britain and Spain, France and Spain, and France and Italy (1904). While the above-mentioned treaties except questions of national independence, vital interests, and honor from arbitration, the treaty between Holland and Denmark (1904) covers all questions whatsoever.

In 1904 arbitration treaties were negotiated by the United States with Germany, Great Britain, Italy, Spain, and Portugal, for the submission of judicial disputes and disputes relating to the interpretation of treaties to The Hague Tribunal, but were not ratified by the United States Senate. In 1911 arbitration treaties were signed by the United States Secretary of State and by the ambassadors of the United Kingdom and France, providing for the submission to The Hague Tribunal, or to some other arbitral tribunal, of all disputes arising out of claims of rights made by the one party against the other under treaty or otherwise, and susceptible of decision by the application of the principles of law or equity. The treaties provided further

for the creation of Joint High Commissions of Inquiry, to which any controversy might, by the request of either party, be submitted for impartial investigation, before being submitted to arbitration; such commissions to report on the facts in controversy and to make recommendations. The reports of the commissions were not to be regarded as decisions either as to the facts or as to the law. The treaties further provided that in case the parties disagreed as to whether a difference was subject to arbitration or not, the question was to be submitted for decision to an international Joint High Commission of Inquiry. The latter provision was stricken out by the United States Senate, in consequence of which action the treaties were allowed to lapse by the Executive.

The following is a list of some of the principal arbitrations and adjustments to which the United States has been a party:

1. Between the United States and Great Britain, under the Jay Treaty of 1794, providing for three mixed commissions: one to settle the identity of the St. Croix River, on the northeastern boundary; one to determine the compensation for impediments imposed by some States to the collection of debts by British creditors, in violation of the treaty of peace; a third to settle the question of contraband, rights of neutrals, and finality of decisions of prize courts.

2. Between the United States and Great Britain under the Treaty of Ghent, 1814, providing for three commissions: one to settle the ownership of certain islands in Passamaquoddy Bay and the Bay of Fundy; a second to determine the boundary of the United States from the St. Croix to the St. Lawrence; a third to determine the boundary of the United States along the middle of the Great Lakes to the water communication between Lakes Huron and Superior and to the Lake of the Woods.

3. Between the United States and Great Britain, in 1818, regarding the obligation of Great Britain to restore slaves in the British possessions at the time of signing the Treaty of Ghent. Referred to the Emperor of Russia, who decided that the United States was entitled to compensation for slaves transported from territories restored under the treaty. Two mixed boards created to determine the claims disagreeing, the sum of $1,204,960 was finally accepted by the United States.

4. Between the United States and Spain, in 1819, regarding the satisfaction of American claims against Spain during her occupation of Florida. By the terms of the Treaty of Florida, the United States agreed to settle these claims.

5. Between the United States and Great Britain, in 1827, for the settlement of the northeastern boundary. The King of the Netherlands was chosen arbitrator, but his award was not accepted by the United States. The matter was compromised in the Webster-Ashburton Treaty.

6. Between the United States and France the claims of American citizens growing out of French depredations at sea during the Napoleonic wars, and the French Beaumarchais Claim, and claim to special commercial privileges under the Louisiana Cession Treaty, were adjusted by Minister Rives in 1831 by an indemnity to the United States of $5,558,108.07.

7. Between the United States and Great Britain in 1855 to determine by a mixed commission the "Reserved Fisheries Rights" under the Reciprocity Treaty of 1854, which renewed the privileges renounced in 1818, of taking and curing fish in "unsettled bays, harbors, and creeks" along the Canadian shore. The commission defined "rivers and river-mounts" reserved under the treaty, and concluded its work in 1866.

8. Between the United States and Great Britain, in 1871, by the terms of the Treaty of Washington, providing for the submission to arbitration of: (1) The San Juan water boundary. Referred to the Emperor of Germany, who sustained the American claim. (2) The Nova Scotia fishery rights. (3) Claims and counterclaims growing out of the Civil War, other than the *Alabama* Claims. (4) The *Alabama* Claims. Under the second, an award of £1,100,000 was given to Great Britain, and under the third, £386,000.

9. Between the United States and Great Britain, and Germany in 1889, to determine their claims in the island of Samoa. The appointment of the Chief Justice of Samoa was referred to the King of Sweden and a joint commission established. In 1899 complications arose, resulting in a joint high commission proceeding to the Samoan Islands. There resulted an agreement for their partition, signed in Washington, Dec. 2, 1899.

10. Between Great Britain and the United States, in 1892, regarding the Bering Sea seal fisheries. The commission gave a divided award, mainly in favor of Great Britain, in 1893; but in favor of the United States' admission of the necessity for regulation of pelagic sealing and the proposal for such regulations. Later, in 1896, a further commission was created to award the amount of damages due to Canadian sealers under the former decision. This was fixed at $471,151.

11. Between Great Britain and the United States, in 1897, to determine the boundary between Alaska and Canada. After a decision was reached, the commissioner's work was interfered with by an Act of the British Columbia Legislature. A subsequent determination of the question was reached on the same lines in 1899.

12. Between the United States, Great Britain, and Germany in 1899 for the adjustment of claims of German citizens arising out of the bombardment by American and British warships of Samoan villages.

13. Between the United States and Russia, in 1902, in the Russian Seal Cases. The dispute grew out of the seizure in 1891 by a Russian cruiser of four American vessels in Bering Sea. The arbitrator decided in favor of the United States, laying down the principle that a war vessel may not pursue a vessel of another nation beyond territorial waters.

14. The settlement, in 1903, of the Alaska Boundary dispute, by a joint commission representing the United States and Great Britain.

Consult: Balch, *International Courts of Arbitration* (Philadelphia, 1896); Moore, *History and Digest of International Arbitrations to which the United States has been a Party* (Washington, 1898); Darby, *International Arbitration, International Tribunals* (London, 1900); Foster, *Arbitration and The Hague Court* (Boston, 1904); Quesada, *Arbitration in Latin America* (Rotterdam, 1907); Jones, *International Arbitration* (London, 1907); Morris, *International Arbitration and Procedure* (New Haven, 1911). See HAGUE CONFERENCE; HAGUE

TRIBUNAL; INTERNATIONAL PEACE MOVEMENT; INTERNATIONAL LAW; ALABAMA CLAIMS.

**ARBITRATION,** LABOR. See LABOR AND CAPITAL, RELATIONS OF.

**ARBOGA,** är-bō'gȧ. An ancient city in Sweden, in the province of Westmannland, 10 miles from the mouth of the Arboga River, by which, with the aid of a canal, the lakes Hjelmar and Mälar are united (Map: Sweden, E 7). Of all the churches, cloisters, and chapels, there remain only the town and parish churches, the former with an altar-piece of Rembrandt. Church assemblies were held here in 1396, 1412, 1417, 1423, and 1474; diets in 1435 (the first in Sweden), 1440, 1471, 1529, and 1561, at the last of which certain articles, known as the Arboga Articles, were passed. By these Eric XIV was enabled to limit the power of the nobles. In 1625 Gustavus Adolphus here issued an edict commanding that copper coin of the realm should maintain full value of that metal. Pop., 1901, 5250.

**AR'BOGAST, ARBOGAS'TES** (?–394). A Frank who, banished from his country, became a distinguished general in the Roman service. During the reign of Gratian he successfully commanded an expedition against the Germans, in 381; under Valentine II he was commander in Gaul. After winning the favor of his army by his ability and his victories over the Gauls, he defied the authority of Valentinian, who killed himself in 392, though a later story declared that he was murdered by Arbogast's orders. Eugenius, Arbogast's client, was proclaimed Emperor, since he himself, as a barbarian, could not gain the throne; but after suffering a defeat at the hands of Theodosius, near the river Frigidus, north of Aquileia, Arbogast killed himself.

**ARBOIS,** är'bwä'. A town of France in the department of Jura, France, 6 miles northeast of Poligny (Map: France, N., F 6). It is situated in the valley of the Cuisance, which is noted for its excellent wine. Pasteur spent his boyhood in Arbois, and there is a statue in his honor. Pop., 1911, 3926.

**ARBOIS DE JUBAINVILLE.** See JUBAINVILLE, MARIE HENRI D'ARBOIS DE.

**ARBOLEDA,** är'bō-lā'dȧ, JULIO (1817–62). A Colombian poet and political leader. He was born at Barbacoas and was educated in Europe. In 1856 he joined the Conservative revolt in Antioquia and soon became the leader of his faction. He concluded an alliance with President Moreno, of Ecuador, and made war upon the Federalist dictator, Mosquera. With the support of the states of western Colombia, he assumed supreme power, but soon afterward was assassinated. In a literary way he is chiefly known for his poems, which, including *Dios y la virtud, Estoy en la cárcel,* and *Me ausento,* gave him high rank among Spanish-American poets. The manuscript of his most important work, *Gonzalo de Oyón,* was almost completely destroyed by an enemy, and only fragmentary copies are preserved.

**AR'BOR DAY** (Lat. *arbor,* tree). A day set apart by the legislatures of most of the States and Territories of the United States for the annual planting of trees by the people and more especially by the school children. B. G. Northrop, while secretary of the Connecticut Board of Education, seems to have been the first—in 1865—to suggest the annual planting of trees under the direction of a State government. J. Sterling Morton was probably the first, however, to propose the setting apart of a certain day annually for the purpose, and in 1872, largely through his efforts, the custom was instituted in Nebraska. At present Arbor Day is observed in nearly every State and Territory; in some as a legal holiday, in others as a school holiday. In addition, several States, including New York, publish an Arbor Day manual. The exact date is not uniform throughout the country, though it generally falls late in April or early in May in the northern States, while in the southern States the day occurs in December, January, or February.

**ARBOR DIA'NÆ** (Lat. tree of Diana, the alchemic name of silver). An arborescent precipitate of metallic silver from a solution of silver nitrate, produced by the addition of a metallic element such as mercury.

**AR'BORE'TUM** (Lat. from *arbor,* a tree). A park or nursery containing a collection of specimen trees. See BOTANIC GARDEN; FORESTRY; HORTICULTURE; NURSERY.

**AR'BORICUL'TURE** (Lat. *arbor,* tree + *cultura,* care, cultivation). A term referring to the scientific cultivation of trees. It embraces that part of horticulture which treats of the planting and cultivation of ornamental and fruit trees and that part of forestry known as sylviculture. The horticultural growing of various trees is discussed under the corresponding special headings. Forest practices are described under FORESTRY.

**AR'BOR VI'TÆ** (Lat. tree of life), *Thuja.* A genus of plants of the family Pinaceæ, allied to the cypress, and consisting of evergreen trees and shrubs with compressed or flattened branchlets—small, scale-like, imbricated leaves. Species of arbor vitæ are found in the north temperate zones of both hemispheres. The common arbor vitæ (*Thuja occidentalis*) is a native of North America, especially between lat. 45° and lat. 49°, but has long been well known in Europe. It is a tree 40 to 50 feet high; its branches are horizontally expanded, and the strobiles (cones) small and obovate. The young leafy twigs have a balsamic smell, and both they and the wood were formerly in great repute as a medicine; the oil obtained by distillation from the twigs, which has a pungent and camphor-like taste, has been recommended as a vermifuge. The wood of the stem is reddish, soft, and very light, but compact, tough, and durable, bearing exposure to the weather remarkably well. The tree is common in Great Britain, planted chiefly as an ornament. It seldom attains so great a size as in its native country. It flourishes in cool, moist localities. The Chinese arbor vitæ, *Thuja orientalis,* a native of China and Japan, which is immediately distinguishable from the former species by its upright branches and larger, almost globose, and rough strobiles, is also, in Great Britain and upon the continent of Europe, a common ornament of pleasure grounds; but it does not attain so great a size as the preceding, and is more sensitive to the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin with a pleasant odor, to which medicinal virtues were once ascribed; hence the name, "arbor vitæ," given to this species and extended to the genus. There are several other species of Thuja, some of which seem well suited to the open air in the climate of Great Britain. Among them are *Thuja plicata,* California to Alaska, and *Thuja*

*dolabrata*, a native of Japan, a tree of great height and thickness. In favorable forest conditions *Thuja plicata* becomes a rather large tree, 150 to 200 feet tall, the timber of which is very valuable. There are about 60 horticultural varieties of the American species, that vary in habit of growth, color of foliage, or other characteristics. Many of these are popular in landscape gardening. A tree common in North America and there known by the name of white cedar is sometimes included in the genus Thuja, under the name of *Thuja sphæroidea*, but is more generally ranked in the genus *Cupressus* as *Cupressus thyoides*. (See CYPRESS.) Closely allied to the genus Thuja is *Callitris*. See SANDARAC.

**Fossil Forms.** The genus Thuja, like many other forms of conifers, is represented by ancestral forms in Cretaceous rocks of northern Europe, and with the advance of time is found to have migrated from northerly to more southerly regions, till during Miocene time it disappeared from Europe. Thuja is also known in the Miocene beds of Dakota.

**AR'BOS,** FERNANDEZ (1863—). A Spanish violinist and composer, born in Madrid, Dec. 25, 1863. He received his first instruction on the violin from Monasterio in Madrid, later studying with Vieuxtemps and Joachim. Soon after becoming concertmaster of the Berlin Philharmonic Orchestra he resigned in order to accept a position as teacher of violin at the Conservatory in Hamburg. At the request of the Queen of Spain he returned to his native city in the capacity of principal professor of violin at the Conservatory of Madrid. In 1890 he settled in London where he appeared as soloist and conductor with signal success, acting also as professor of violin at the Royal College of Music. He began in 1902 to spend three months of every year in Spain, visiting the principal cities as conductor of the Madrid Symphony Orchestra. His compositions include a comic opera, *El Centro de la Tierra* (1895); three trios for piano, violin, and 'cello; some orchestral works, and numerous compositions for violin.

**ARBROATH,** är-brŏth' (Celt. *aber*, confluence, mouth + *Brothock*), ABERBROTHWICK, ăb'ĕr-brŏth'ĭk, or ABERBROTHOCK, -ŭk. A seaport town in Forfarshire, Scotland, on the North Sea, about 17 miles by rail east-northeast of Dundee (Map: Scotland, F 3). Here King William the Lion founded a Tyronesian abbey in honor of Thomas à Becket in 1178. The King was interred in it in 1214. In the abbey, Bruce and the Scottish nobles met in 1320, to resist the claims of Edward II to Scotland. Its ruins, which are cruciform, 270 by 160 feet, are very picturesque, presenting lofty towers, columns, Gothic windows, etc. The chief industries of Arbroath include flax spinning, jute spinning, the manufacture of sail cloth, boots and shoes, and tanning. There are chemical and iron works. The harbor admits vessels of 400 tons and is protected by a breakwater. The chief exports are grain, potatoes, fish, pork, and paving stones. Arbroath is a royal burgh, and, in conjunction with Montrose, Brechin, Forfar, and Bervie burghs, returns one member to Parliament. Pop., including St. Vigeans, 1901, 24,677; 1911, 22,730. The famous Bellrock lighthouse stands in the sea 12 miles southeast of Arbroath.

**AR'BUCKLE,** JOHN (1838–1912). An American capitalist and philanthropist, born in Scotland. He came to the United States with his parents when he was still a child, and was educated in the public schools of Allegheny, Pa. In 1871 he removed to New York City, where, with his brother Charles, he established a coffee business. The sale of coffee in packages, a specialty of the house, having proved immensely profitable, Arbuckle soon conceived the idea of selling sugar in the same way. To further his plan he made an agreement with H. O. Havemeyer, by which the latter was to provide the sugar to be sold. But the retailing of this commodity in package form was so successful that the American Sugar Refining Company, of which Mr. Havemeyer was president, decided to go into the business itself and refused longer to supply Arbuckle. The latter thereupon began the refining of raw sugar for himself, initiating a bitter struggle of many years with his rival. After Arbuckle had been shown that the Sugar Company could sell coffee, as well as sugar, in packages, for the sake of retaliation, a compromise was at last effected in 1901. The Sugar Company had not found the sale of coffee profitable and was ready to give up handling it. Mr. Arbuckle then expanded both departments of his business until he was one of the leading merchants of the United States. In addition to his sugar and coffee enterprises, he was engaged in the wrecking business, and, after spending many years in working out a system for the floating of sunken ships, at length succeeded in putting into operation a device which expelled the water by means of compressed air. Among the ships raised by this method were the United States cruiser *Yankee* and the United States collier *Nero*. During his later years Mr. Arbuckle devoted much of his great fortune to philanthropy and was particularly interested in making life easier for working girls. On a farm of 800 acres at New Paltz, N. Y., he gave occupation to many men from New York and Brooklyn, to whom outdoor air was a necessity.

**ARBUÉS,** är-bwās', PEDRO (1441–85). A Spanish inquisitor. He was born at Epila, Aragon; became a member of the Augustinian College at Saragossa, and in 1484 was appointed first inquisitor of Saragossa by Torquemada, inquisitor-general. He was a tireless persecutor of all heretics, real or suspected, and was finally slain through a conspiracy of those who feared that the Inquisition might reach them. He was canonized by Pope Pius IX in 1867.

**AR'BUTHNOT,** JOHN (1667–1735). A Scottish author and physician, the contemporary and friend of Pope and Swift. He was the son of an Episcopal clergyman, and was born at Arbuthnot, Kincardineshire. He studied medicine at Aberdeen, but took his degree at St. Andrews. Arbuthnot's father lost his preferment at the outbreak of the Revolution. His sons' prospects being thus blighted in their own country, the family were compelled to go abroad to seek their fortune. John went soon after to London and there supported himself by teaching mathematics. In 1697 he published an examination of Dr. Woodward's account of the Deluge, which brought him into notice as a person of unusual ability. Accident called him into attendance on Prince George of Denmark, who thenceforth patronized him. In 1709 he was appointed physician in ordinary to the Queen, and in 1710 was elected a member of the Royal College of Physicians. On the death of Queen Anne, in 1714, he lost his place at court, and his cir-

cumstances were never so prosperous afterward. In 1717 Arbuthnot, with Pope, helped Gay in a farce, entitled *Three Hours after Marriage*, which, however, proved a complete failure. In 1723 he was chosen second censor of the Royal College of Physicians, and in 1727 he pronounced the Harveian oration for the year. He died at Hampstead in 1735.

Arbuthnot's literary fame rests upon two humorous pieces. In 1712 he published the *History of John Bull*, one of the most amusing of political satires. After his death appeared (in Pope's *Works*, 1741) the *Memoirs of Martinus Scriblerus*, in which every kind of pedantry is ridiculed. John Bull as a nickname for the typical Englishman has been traced back farther than Arbuthnot, but *Scriblerus* is one of the important sources of Sterne's *Tristram Shandy*. Arbuthnot was one of the most amiable of men. To him Pope addressed his best *Epistle* and Swift said that if there were a dozen Arbuthnots in the world he would burn his *Gulliver's Travels*. Consult G. A. Aitkin, *Life and Works of Arbuthnot* (London, 1892).

**ARBUTHNOT,** Marriot (1711–94). A British admiral. He became a commander in 1746 and a captain in 1747; was commissioner of the navy at Halifax, N. S., from 1775 to 1778; became a rear-admiral in 1778, and in 1779 was appointed vice-admiral and placed in command of the North American Station. In conjunction with Sir Henry Clinton he captured Charleston, S. C., after a long siege, in 1780 (May 12), and in March, 1781, fought an indecisive engagement with a French fleet off Cape Henry. He surrendered his command to Rear-Admiral Graves in July, 1781, returned to England, and though he saw no more actual service, he became by seniority Admiral of the Blue in 1793. As a naval officer he was absurdly inefficient, being ignorant of even the rudiments of naval tactics, and as a man he seems to have been known to his contemporaries as a coarse and blustering bravo. Consult Ralfe, *Naval Biography* (London, 1820).

**ARBUTUS,** är'bū-tŭs *or* är-bū'tŭs (Lat. the wild strawberry tree). About 10 species of shrubs and trees belonging to the family Ericaceæ, natives of western Europe and western North America. In many species the leaves are evergreen and shining, the branches usually smooth and red. Such a species is *Arbutus Unedo*, the 'strawberry tree,' extensively planted as an ornament in parks. It is a native of the south of Europe and is not hardy in the colder parts of the United States. It is highly valued in California. The flowers, which are white, are produced in great abundance; the fruit, which resembles a strawberry in size and color, is ripened the second year. In this way flowers and fruits occur together, and, with the bright green leaves, make the tree very attractive. The fruit is edible and often utilized, especially in Spain, where sugar and a spirit are manufactured from it. A second species, *Arbutus menziesii*, is the madroña of California. It is fairly hardy, and as a tree often attains a height of 80 to 100 feet. *Arbutus arizonica*, a tree 40 to 50 feet high, has the bark of the trunk white, of the branches red, which, together with the pale-green leaves, makes a pleasing contrast.

**ARBUTUS,** Trailing (*Epigœa repens*). A prostrate or trailing plant, called Mayflower in New England and ground laurel in the southern States, with evergreen leaves, rusty, bristly shoots, and axillary clusters of fragrant, rose-colored or white flowers, opening in early spring; found in sandy or rocky soil, especially in the shade of pines. It grows from Newfoundland to the Saskatchewan, and south to Florida, Kentucky, and Wisconsin.

**ARC** (Lat. *arcus*, a bow). Any part of a curved line. It is usually limited to a part not including a cusp, and more particularly is applied to part of the circumference of a circle, as in the following statements: The straight line joining the ends of an arc is called its chord. Arcs of different circles are similar when they subtend equal central angles of their respective circles; if these circles are equal, so are the similar arcs. Circular arcs have the same numerical measure as the central angles which they subtend, and hence are commonly said to measure and to be measured by those angles. Like their subtended central angles, arcs may be considered as positive or negative and as exceeding 360°. (See Angle.) An arc is distinguished as major or minor, according as it is greater or less than a semi-circumference. The arc equaling in length the radius of a circle is called a *radian;* it is nearly 57° 17′ 44.8″. There are, therefore, $2\pi$ radians in a circumference.

**ARC,** Electric. See Electric Arc, Electric Lighting.

**ARC,** Joan of. See Joan of Arc.

**ARCACHON,** är'kȧ'shôn'. A charming French town and favorite watering place on the Bay of Biscay, in the department of Gironde, on the south side of a lagoon, the Basin d'Arcachon, 34 miles southwest of Bordeaux by rail (Map: France, S., C 4). Its popularity as a resort began in 1854. Its fine broad sands are admirably adapted for bathing, and the place is sheltered by sand hills covered with extensive pine woods of the Landes. Its main street stretches 2½ miles along the shore, with the pine forests immediately behind. The climate is always temperate, averaging in summer 47° F. and in winter 41°. Its numerous villas among the firs are much frequented in the winter by invalids afflicted with lung disease. Scientific oyster culture is practiced here on a large scale. The trade is chiefly with England and Spanish towns. Pop., 1901, 8259; 1906, 9279; 1911, 10,266. Consult *Arcachon* (Paris, 1899).

**ARCADE'** (Fr. from Lat. *arcus*, bow, arch vault). A row of arches supported by columns or piers. In Roman architecture, which first made use of the arcade systematically, the arches were invariably supported on piers, which were adorned with engaged columns carrying entablatures in structures like the Coliseum (q.v.), but left plain in utilitarian structures like the aqueducts. The earliest use of columns to support an arcade was in the palace of Diocletian at Spalato in Dalmatia (c.300 A.D.). In the early Christian basilicas columnar arcades were used to separate the nave and aisles; in Byzantine architecture both piers and columns were used as arch supports, as occasion demanded. The builders of the Romanesque and Gothic periods developed the clustered pier as an arch support and made admirable decorative use of arcades in the triforium (q.v.) galleries or passages and on the west fronts of their churches; of this the most noted example is the cathedral of Pisa. Very beautiful are the arcades inclosing the cloisters of many cathedrals and abbeys. The Renaissance employed both the columnar

and the Roman type of arcade, the former being especially common in the courtyards, loggias, and cloisters of Florence, northern Italy, and Spain. The street arcades of Bologna and of the Rue de Rivoli, Paris, are famous.

The term is often applied not merely to a row of arches, but to the entire passage or structure of which they are the front. It is also used, improperly, of any glass-roofed street or alley flanked by shops or stalls. A small decorative arcade applied against a wall is called an *arcature* (q.v.).

**AR'CADELT,** JACOB. A Flemish composer who assisted in founding the classical Italian school of music. The date of his birth is uncertain, but is believed to have been during the first quarter of the sixteenth century. His works are among the masterpieces of contrapuntal music of the Middle Ages. He was the most popular composer of his day, and his popularity induced many persons, for business reasons, to add his name to works written by others. During a residence in Rome (1539–55), as teacher and as singer in the Papal Chapel, he composed many madrigals. His works also include motets and masses. Arcadelt probably died about 1570–75, while in Paris with Cardinal Charles, Duke of Guise, whose service he entered in 1557. Consult Burney, *General History of Music*, vol. iii (London, 1789), and Ambros, *Geschichte der Musik*, vol. ii (Leipzig, 1909).

**ARCADES,** är'kā-dēz. A masque written by John Milton in 1634 and published in 1645. It was acted shortly after *Comus*, before the Countess Dowager of Derby, wife, first of Fernando, Earl of Derby, and afterward of Thomas Egerton, Lord Ellesmere, when she was living at Harefield, near Uxbridge. It was set to music by Mr. Lawes at the same time. In it the Countess's guests appear on the scene in pastoral habit and move toward the seat of state with a prefatory song of compliment. A "genius of the wood" then comes forward and describes the significance of the occasion, after which the piece closes with two more songs of flattery.

**ARCA'DIA** (Gk. *Ἀρκαδία, Arkadia*). The middle and highest part of the Peloponnesus, bounded on the north by Achaia, on the east by Argolis, on the south by Messenia and Laconia, and on the west by Elis. According to Pausanias, it derived its name from Arcas, the son of Callisto. Next to Laconia, Arcadia was the largest country in the Peloponnesus. It had an area of 1800 square miles and was girt round by a circle of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions, forming a number of small cantons. The western part of what was anciently Arcadia is wild, bleak, and rugged, and covered with forests; the eastern is more fertile; and in the southeast are two plateaus, in which lay the chief ancient cities.. The loftiest peak in Arcadia is Mount Cyllene, in the northeast, 7790 feet. The small rivers are either tributaries of the Alpheus, or empty into inland lakes drained by underground channels (*katavothra*). The chief cities were Tegea and Mantinea in the southeast, and the great city, Megalopolis, founded in 370 B.C. by Epaminondas as the capital of the Arcadian Confederacy. Farther north were Orchomenus, Pheneus, Clitor, and Psophis. Owing to its isolation, Arcadia remained little affected by the Dorian conquest of the Peloponnesus, and its inhabitants were regarded as belonging to the original population of the peninsula; a belief confirmed by their dialect, which preserves some early forms and shows strong resemblances to the Cyprian. The nature of the country also prevented any lasting union among the inhabitants and enabled the Spartans to maintain their supremacy until the battle of Leuctra. The confederation organized by Epaminondas had no real permanency, and until the Roman conquest the country was the scene of civil strife. The inhabitants were brave, hardy, and fond of fighting, so that they were in great demand as mercenaries. Among their shepherds and hunters the chief deities seem to have been Pan, Artemis, and Zeus, who was worshiped with human sacrifices on Mount Lycæon till a comparatively late date. A form of pastoral poetry seems to have developed in Arcadia, which was at first crowded into the background by the Sicilian bucolics of Theocritus; but later revived and influenced the Roman poets, whence Arcadia, or Arcady, has become a synonym for an idyllic pastoral country of peace, innocence, and simplicity.

**ARCA'DIA.** The title of various pastoral romances, suggested, doubtless, from the use of the word in Vergil's *Eclogues*, where it is spoken of as a realm of bucolic content. One of these romances is by Sannazaro, and appeared at the close of the fifteenth century; another is by Sir Philip Sidney, and was published in 1590; a third is by Robert Greene, published in 1589; and a fourth by Lope de Vega, in 1598. In 1640 Shirley wrote a dramatization of Sidney's tale. Consult W. W. Greg, *Pastoral Poetry and Pastoral Drama* (London, 1906).

**ARCA'DIUS** (c.377–408). The first Emperor of the East (395–408). He was born in Spain, and was the son of the Emperor Theodosius, after whose death the Roman Empire was divided into the Eastern and the Western Empires. Arcadius lived in Oriental state, and his dominion extended from the Adriatic Sea to the river Tigris and from Scythia to Ethiopia; but the real rulers over this vast Empire were, first, the Gaul Rufinus, later the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while Arcadius reposed in luxurious indifference. In 399 Eutropius was deposed by another usurper, Gainas, who, in his turn, soon fell a victim to his own ambition. Afterward Eudoxia, the wife of the Emperor, assumed the supremacy. One really great man adorned this period, the virtuous and eloquent Chrysostom (q.v.), who was persecuted by Eudoxia, and through her influence exiled in 404, on account of his firm opposition to Arianism, which the Empress herself favored. During the reign of Arcadius his territories suffered by barbarian incursions, earthquakes, and famine, but nothing could disturb the indifference of the monarch. He died, unlamented, in 408. See HONORIUS, and consult *The Cambridge Medieval History*, vol. i (New York, 1911).

**ARCA'NI DIS'CIPLI'NA.** See DISCIPLINA ARCANI.

**ARCA'NUM,** THE GREAT. In the Middle Ages the Latin word *arcanum*, literally meaning 'secret,' was used of any of the most valued preparations of alchemy (q.v.); but the name "great arcanum" was especially applied to the highest problems of the science, the discovery of such supposed great secrets of nature as the elixir of life or the philosopher's stone.

**AR'CATURE** (Fr. *arcature*, Lat. *arcus*, a bow, arc, curve). In architecture, especially that of the Middle Ages, a small or subordinate decorative arcade applied against a wall or built into it. The most common occurrence of arcatures is on the interior of side-aisle walls under the windows, especially in French Romanesque and Anglo-Norman churches of twelfth and early thirteenth centuries (e.g., Durham, Peterborough); rarely on exteriors as at Christchurch. In the Gothic styles beautiful arcatures occur on choir inclosures as well as under side-aisle windows. The attic wall under the eaves and above the main cornice of Rheims is decorated with an arcature of unusual beauty.

**ARC DE TRIOMPHE DE L'ETOILE,** ärk de trē'ônf' de lā'twäl' (Fr. triumphal arch of the star). The largest triumphal arch in the world. It stands at the head of the Champs Elysées, Paris, and was begun by Napoleon in 1806 and completed by Louis Philippe in 1836. It was designed by Chalgrin and is profusely ornamented with reliefs representing the Napoleonic victories, in commemoration of which it was erected. See ARCH, TRIUMPHAL.

**ARC DE TRIOMPHE DU CARROUSEL,** ärk de trē'ônf' dụ kà'rōō'zĕl' (Fr. triumphal arch of the tilting match). An arch built by Napoleon I at Paris, in the square inclosed by the Tuileries and the Louvre, in commemoration of his victories during 1805–06. It is a smaller copy of the Arch of Constantine at Rome. See ARCH, TRIUMPHAL.

**AR'CE,** *Sp. pron.* är'thā, FRANCISCO (1822–78). A California pioneer. He removed to Alta, Cal., in 1833, and soon afterward became secretary to Gen. José Castro, then commanding the Californian forces and an officer in the Mexican army. In 1846, while bringing a number of horses, supposed to belong to the Californian government, from Sonoma to the south, he was attacked (June 6) by a company of Americans, supposedly instigated by Capt. John C. Frémont. The "Arce affair" attracted widespread attention and marked the beginning of the Bear-Flag Revolt, which resulted in the seizure of California by the Americans.

**ARCEL'LA.** A genus of amœboid protozoans, having a chitinous test or shell which is single and circular in shape, somewhat like the umbrella of a jellyfish. There are two nuclei and more than one contractile vacuole. These organisms have the power of secreting carbonic-acid gas in the form of minute bubbles in the cytoplasm, by this manner floating near the surface of the water. They are common among bog-mosses and confervas.

**AR'CESILA'US** (Gk. Ἀρκεσίλαος, *Arkesilaos*) (316–241 B.C.). A Greek philosopher, founder of the Middle Academy. He was born at Pitane, in Æolis; studied philosophy at Athens, first under Theophrastus the Peripatetic, and afterward under Crantor the Academician, and through the latter became acquainted with Polemon and Crates, by whom, as well as by Crantor, he was profoundly influenced in his philosophic views. After the death of Crantor he became the head of the Academic school. Arcesilaus marks a reaction against the dogmatism of the Stoic school of philosophy, and an intended return to the method and attitude of Plato and Socrates. He denied the Stoic doctrine of a "convincing conception," which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the certainty of intellectual and sensuous knowledge, and recommended abstinence from all dogmatic judgments. In practice, he maintained, we must act on grounds of probability. Though Arcesilaus confined his activity to teaching by the Socratic method and wrote nothing, his influence on the future course of philosophic thought was far-reaching. He had clearness of thought, cutting wit, and readiness of speech; his frank and generous disposition charmed his opponents as well as his disciples. Consult Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893).

**ARCESILA'US.** The name of four kings of Cyrene. See BATTIADÆ.

**ARCH** (Lat. *arcus*, anything curved, a bow, vault, arch). A structural device for spanning an opening by means of a number of wedge-shaped units arranged in a curve convex upward; and hence, also, any structure having the form or appearance of an arch. The supports of an arch may be walls, piers, or columns; the capstones from which it springs or on which it rests are its *imposts;* the wedge-shaped pieces composing it are called *voussoirs;* the upper part of the arch is its *crown*, the portions near the impost are the *haunches;* the two lowest voussoirs are the *springers;* the central or crowning voussoir is the *keystone;* the inner outline or edge of the arch is its *intrados*, the outer line or edge is its *extrados*, and its under surface is its *soffit*. The molded band which often surrounds the opening is called an *archivolt* (q.v.). The wall spaces on either side of an arch, or between adjacent arches, are *spandrels;* a flat vertical slab or filling under an arch, above a lintel or beam set at or near the impost-level, is its *tympanum*. An arch composed of only two stones leaning against each other is an *Egyptian* arch. *A segmental* arch is one whose curve is less than a semicircle; a *horseshoe* arch, one whose curve is more than a semicircle; a *stilted* arch, one whose imposts are set below its actual springing; a *pointed* arch, one whose intrados is formed by intersecting curves, drawn from two opposite centres; a *Tudor* or *Persian* arch, one whose curves are drawn from four centres. A *cusped* or *foiled* arch is one whose soffit is adorned with pointed projections (cusps) bounded by tangent circular curves (foils). A *horizontal* or flat arch is one in which, though radiating voussoirs are used, the intrados curve has been flattened nearly or quite to a straight horizontal line. A *corbeled* or false arch is one formed by horizontal courses successively projecting till they meet at the crown. All true arches exert outward lateral pressures called *thrusts;* the masses of masonry which receive and resist these are *abutments*. *Discharging* or *relieving* arches are those which, imbedded in a wall, relieve the weight on the structure below. *Inverted* arches are employed in foundations to distribute the weights of the piers that rest on them. A *vault* is an arched construction extended to cover an inclosed space and not merely an opening in a wall. The term "arch" is applied not only to masonry structures, but to curved roof-ribs or trusses of timber or metal; it is also loosely used of the whole opening spanned by an arch, and even (see ARCH, TRIUMPHAL) of the entire structure containing an arch as its chief feature.

*History.*—The Egyptians knew the round arch, but relegated it to works of engineering and private architecture; the same is true of the

Greeks. The arch in the Assembly Hall at Priene (time of Alexander) is supposed to be the only decorative Greek arch found. But the Babylonians and Assyrians knew and used both the pointed and the semicircular arch in their palaces, tombs, and temples. All the openings in Assyrian palaces were arched. In ancient Italy the Pelasgic and Etruscan populations used the arch in the same way for secular and sepulchral buildings; only in temple architecture, borrowed from the Greeks of the historic age, was the architrave supreme. It was the Romans who first developed the arch as a dominating feature of external as well as internal design, especially in secular buildings, and applied the vault to cover spacious interiors in temples, baths, and halls. Etruscans, Romans, and early Christians knew only the semicircular arch. But the Persians and Mohammedans, beginning in the sixth and seventh centuries, brought into use a variety of other forms: the pointed, the horseshoe, the ovoid, the stilted arches. The pointed arch became, in fact, the favorite Mohammedan form. It was, perhaps, a knowledge of this Oriental usage that suggested to French builders of the time of the first crusade the use of this form in vaulting; and thus was laid the basis for one feature of Gothic construction, though otherwise there cannot be any connection between the styles of the East and Gothic architecture. In Europe the round-arched style of the Romanesque period was succeeded by the more flexible pointed style of Gothic. Gothic architects produced the greatest number of sub-forms and by-forms of the arch, not all of them pointed. Then the Renaissance returned to the round arch. Modern architects have no style to hamper them and therefore use all kinds. See ABUTMENT; ARCADE; ARCH, TRIUMPHAL; ARCHITECTURE; ARCHIVOLT; BRIDGE; SPANDREL; TIMBREL; VAULT.

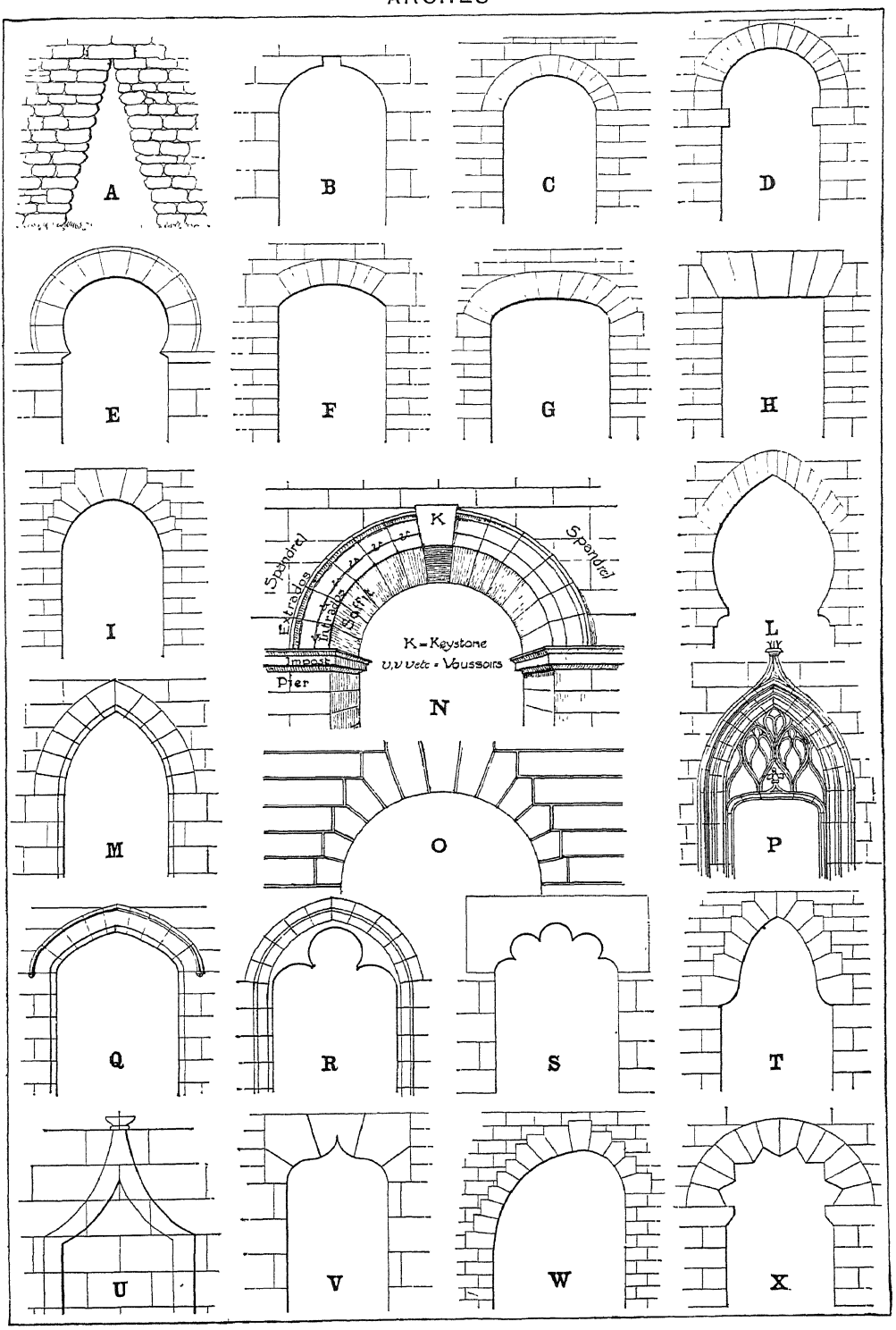
**ARCH,** TRIUMPHAL, or MEMORIAL. Usually a free-standing arch, spanning a road; though sometimes city gates and monumental doorways are turned into memorial arches. These arches are erected to commemorate triumphs or successful campaigns, or even great peaceful events, or an entire reign, or even a great family. They appear to have originated with the Romans. Nearly 150 such Roman arches remain wholly or in part, of which about 60 are in north Africa. At Rome they were placed along the Triumphal Way followed by the triumphing general and his army from the Field of Mars to the Capitol. The earliest arches mentioned at Rome are those of Stertinius (196 B.C.) and Scipio Africanus (190 B.C.). Then the Fabian gens erected one to itself (c.120 B.C.). But it was under Augustus that the custom took root everywhere, as is shown in the Roman Forum, at Aosta, Susa, Rimini, Fano, etc. From that time until the fall of the Empire in the fifth century such arches followed Roman dominion throughout the civilized world, and they are found in France (Saint-Rémy, Reims, St. Chamas, Orange, etc.), Spain (Caparra, Bara), north Africa (Timgad, Tebessa, Thugga, Haïdra), Syria (Palmyra, Gerasa, Baalbek), Asia Minor, etc. The early arches were of stone and without much carving, being mainly arched bases for a group of triumphal statuary. But under the Empire, though still crowned by the triumphal quadriga and other figures in bronze, the arches themselves became of great artistic importance and often represent the most successful effort of Roman genius at combining architectural and sculptural design. They were then built of marble. The number of openings varied from one to four, according as special arcades were or were not made for foot passengers, or two main arches provided for vehicles in place of one. Still another favorite form was the Janus arch, or Tetrapylon, a solid cube, with arches at right angles, usually placed at the intersection of avenues, as at Philippopolis, Gerasa, and Rome. Few cities were built under the Empire without one or more of these arches, but only in Italy and south France were they profusely decorated with relief sculptures. The most perfect of all such sculptured arches is that of Trajan, at Benevento (114 A.D.); then come those of Titus (80), Septimius Severus (203), and Constantine (312) at Rome, and that of Tiberius at Orange. The sculptures commemorated events of these emperors' reigns, and the attic contained the dedicatory inscription. One of the slenderest and most elegant is the one erected on the Mole at Ancona, to celebrate the enlargement of this port by Trajan. The Renaissance resurrected the arch after a lapse of 1000 years (Arch of Alfonso at Naples, fifteenth century), and it has since the seventeenth century steadily increased in popularity in Italy (Arco della Pace, Milan); France (Arc de l'Étoile, Arc du Carrousel); Germany (Brandenburger Thor, Berlin; Siegesthor, Munich), and America (Memorial Arch and Bridge, Hartford, Conn.; Washington Arch, New York; Memorial Arch, Brooklyn).

The term is also used to designate, in early Christian basilicas, the arch with its spandrels which incloses the upper part of the opening of the apse; this was usually decorated with an important mosaic picture. Consult: Baumeister, *Denkmaler des klassischen Altertums* (Munich, 1885–88); Daremberg and Saglio, *Dictionnaire des antiquités grecques et romaines* (Paris, 1881–92); Bellori, *Veteres Arcus Augustorum* (Rome, 1690); and Philippi, *Ueber die römischen Triumphalreliefe* (Leipzig, 1874); Frothingham, *Roman Arches of Triumph* (New York, 1909).

**ARCH,** JOSEPH (1826–1919). An English labor leader. He was born in humble circumstances; was a farm laborer; educated himself, and became a Primitive Methodist preacher. In 1872 he headed the movement for the betterment of the condition of farm laborers in England and founded and was president of the National Agricultural Laborers' Union. In 1873 he visited Canada and the United States to study the condition and prospects of labor and the question of emigration. In 1885 he was elected to Parliament from northwest Norfolk as a Liberal; was defeated in 1886, and reëlected in 1892 and in 1895. In 1898 his autobiography, edited by the Countess of Warwick, was published.

**ARCHÆOLOGICAL INSTITUTE OF AMERICA.** A society for the promotion of archæological investigation and research. It was organized in Boston in 1879, and now has 18 affiliated societies, with headquarters in different American cities. The Institute founded the American School of Classical Studies in Athens in 1881; the American School of Classical Studies in Rome in 1895; the American School in Palestine in 1900, and the School for American Archæology in 1907. These are supported partly by private subscription and partly by the aid of several American colleges. The Carnegie Institution of Washington sup-

# ARCHES




A. TRIANGULAR.
B. FALSE OR CORBELLED
C. SEMI-CIRCULAR, With keystone.
D. STILTED.
E. HORSESHOE.
F. SEGMENTAL.
G. SURBASED OR OVAL.
H. FLAT OR HORIZONTAL.
I. ELLIPTICAL.
K. KEYSTONE.
L. LANCE-SHAPED.
M. GOTHIC.
N. TYPICAL OR ROMAN ARCH, With parts named.
O. RUSTICATED.
P. FLAMBOYANT.
Q. TUDOR.
R. CUSPED.
S. FIVE-LOBED.
T. REVERSED OGEE.
U. INFLECTED, COUNTER CURVED.
V. OGEE.
W. RAMPANT.
X. ZIGZAG.

ports a fellowship in the American School of Classical Studies at Athens, and grants $1500 annually for excavations. In 1912 the School of Classical Studies in Rome was absorbed by the American Academy at Rome (q.v.). The society conducted important excavations of the site of ancient Assos in 1881–83, and has aided the school at Athens in its excavation of Grecian sites, notably that of the Heræum, in the Argolid. A summer field session of the School of American Archæology is held in the southwestern part of the United States, and many important studies of the archæology of this region have been made. Valuable investigations have been made also in several parts of Central America. Besides the *American Journal of Archæology*, a bi-monthly magazine, the society publishes various papers and supplemental reports, and more important publications are in course of preparation, notably a facsimile reproduction of the Codex Venetus of Aristophanes, and important descriptions of the results of special archæological investigations. The society has about 2000 members. Its presidents have been: Prof. Charles Eliot Norton, 1879–90; Seth Low, 1890–96; Prof. John Williams White, 1896–1903; Prof. Thomas D. Seymour, 1903–08; Prof. F. W. Kelsey, 1908–12; Prof. H. L. Wilson, 1912—.

**ARCHÆOLOGY,** ärk'kē-ŏl'ŏ-jĭ (Gk. ἀρχαιολογία, *archaiologia*, antiquarian lore, from ἀρχαῖος, *archaios*, ancient + λόγος, *logos*, science). The science of antiquities—that is, of the material remains of ancient peoples. But from the fact that in its origin and development it has been primarily and chiefly concerned with the artistic and architectural remnants of the Græco-Roman world, archæology is often taken to mean the science of Greek and Roman antiquities, in which sense the term will be used in this article, without losing sight of the connection subsisting between these monuments and those of the more ancient peoples to whom they owe in great measure their inception.

As a science, archæology cannot justly be said to have existed before the last century, although the way had been gradually paved for it from the time of the Italian Renaissance. The passion for the artistic relics of Græco-Roman civilization, which at the end of the fifteenth century took such surprising hold upon the cultured classes of Italy under the papal sway, led to the foundation of museums, in which were gathered statues of bronze and marble, vases, inscriptions, gems, jewelry, and coins, affording material for study and comparison. The spoils brought over from Greece by her Roman conquerors, and the mania for collecting treasures from the same source which had been displayed by many Roman amateurs, as well as the great artistic and architectural activity in imperial Rome under the guidance of Greek masters, rendered that city a mine for the early archæologists; and, furthermore, much filtered in from Greece itself. (Cf. Lanciani, *Ancient Rome in the Light of Recent Discoveries*, Boston and New York, 1889.) It must be admitted that these collectors were enthusiastic rather than scientific, and that the works of art discovered were ruthlessly restored to present a pleasing appearance, often at the complete sacrifice of accuracy. Heads and bodies of totally different style were frequently joined in hybrid combinations which still mislead the uninformed.

The father of modern archæology is Johann Joachim Winckelmann (1717–68) (q.v.), whose writings, although superseded in many points, are still of value; by his genius he marked out the field since so successfully cultivated. He was the first to present to European scholars an authentic account of the discoveries made in the Campanian city of Herculaneum (q.v.), and, more than all, was the first to write a systematic history of ancient art (*Geschichte der Kunst des Alterthums*, 1764; see Winckelmann's complete works, edited by Meyer and Schulze, Dresden, 1808–20). By a passage in Winckelmann's writings, Lessing (q.v.) was stimulated to the composition of his great æsthetic essay, "Laocoön," and Goethe also was powerfully influenced by him. Thus the seed of the new science was planted, to develop after the era of the wars of the French Revolution. Like his predecessors, Winckelmann knew Greek art only through the copies of the Roman period, or the few originals of later times; but even through this haze he was able to distinguish some of the characteristics of the period, so that his works prepared the way for the better appreciation of the discoveries of the early nineteenth century.

Then came Napoleon's invasion of Egypt, which opened the treasures of the Nile valley to European scholars, while the discovery of the key to hieroglyphic writing threw new light on the early history of the East. In Greece itself English scholars were at this time accomplishing all that could be done under the Turkish régime. The most notable achievement was the splendid work of James Stuart (q.v.) and Nicholas Revett, *The Antiquities of Athens* (4 vols., 1762–1816). The expedition sent out by the Society of Dilettanti (see DILETTANTI SOCIETY) to continue their work, however, accomplished but little. At length the true character of the art of the fifth century B.C. became clear when, in 1803–12, Lord Elgin brought the sculptures of the Parthenon to London. (See ELGIN MARBLES.) In 1811 the English and German explorers recovered the remains of the remarkable pedimental groups of the temple on the island of Ægina. These were purchased by Prince Ludwig of Bavaria and placed in the Glyptothek at Munich. (See ÆGINETAN SCULPTURES.) In the following year the same explorers recovered the reliefs from the temple of Apollo Epicurius at Bassæ, near Phigalia, in Arcadia, which were subsequently acquired by the British government and form a most important part of the archæological treasures of the British Museum. The successful termination of the Greek War of Independence (1821–29) opened a new mine from which something was immediately realized by the French exploration of the Morea (Peloponnesus) in 1829, which brought to the Louvre the first specimens of the Olympic sculptures. Soon after this the little temple of Athena Nike was rescued from the Turkish bastion, in which it had been incorporated, and replaced again at the western end of the Acropolis of Athens. In Sicily the exploration of the many Greek sites led to the discovery of the early sculptures of Selinus (q.v.), while the systematic excavation of Pompeii (q.v.) brought to light the paintings and household ornaments of the first century. At about the same time the discovery of the great necropolises of Etruria, especially that of Vulci, in 1828, not only opened the whole field of Etruscan art, and especially of mural painting,

to study, but also added thousands of vases, Greek and Etruscan, to the material available for reconstructing the life and thought of the past. The importance of the vases, not for art alone, but for the study of daily life and mythology, was at once recognized; but unfortunately the strict methods of scientific interpretation were not at first followed, and for many years the wildest subjectivity sought to find a whole system of mystic symbolism in these gifts to the dead. Fortunately this has now been superseded by a careful study of the language and methods of the Greek potter. (See VASE.) This growth of material, making necessary some organization of the laborers in the new science, brought about the foundation in Rome, of the "Istituto di Corrispondenza Archeologica," by Bunsen, Gerhard, the Duke of Luynes, and others, on Dec. 9, 1828. This was one of the most important steps in the history of archæological progress. This institution, now the Imperial German Archæological Institute (Kaiserlich-Deutsches Archäologisches Institut), has, by its publications and by the training of young scholars, been of inestimable value. The French School of Archæology, established at Athens in 1846, as well as the activity which began to be displayed by certain Greek savants under the Bavarian régime, had also an important influence on the development of archæology. A large part in this development was played by the pupils of F. A. Wolf, especially by A. Boeckh, whose aim was a complete reconstruction of ancient life, and who were therefore ready to welcome light from other sources than the literary monuments which had so long absorbed the attention of classical scholars. The discoveries of Layard at Nineveh (1845–46), and the subsequent decipherment of the cuneiform inscriptions (q.v.), revealed the ancient civilization of Assyria and Babylonia and gave new material for a more accurate estimate of the relative position of Greek culture and art. Important contribution was made to the British Museum by the discoveries of Sir Charles Fellows in Lycia (1840), of Wood at Ephesus (1867–74), and of Newton at Branchidæ, Halicarnassus, and Cnidus.

The study of Greek inscriptions (see INSCRIPTIONS) under Boeckh and Franz, and of comparative linguistics under Bopp and his successors, contributed their share to the modern archæologist's equipment. This narrative brings the account down to the last 30 years of the nineteenth century, during which a series of discoveries were made whose full importance cannot perhaps yet be fully estimated.

The first place in this series of discoveries must be given to the excavations of Heinrich Schliemann (q.v.) at Troy, Mycenæ, and Tiryns, which brought to light the remains of pre-Homeric Greece and revolutionized our conceptions of the development of the early Ægean civilization. These finds have been supplemented and explained by the work of Flinders Petrie and others in Egypt, of the English on Melos, and especially by the most recent explorations in Crete. The peculiar Cypriote civilization, which first attracted attention through the finds of de Vogüé in 1862 (now in the Louvre) and the collections of Cesnola, has since been studied scientifically in 1883 by Ohnefalsch-Richter and by other German and English scholars.

Of the greatest importance in the development of archæological study in Greece has been the establishment of other foreign schools besides the French Institute in Athens. The first of these was the Athenian branch of the German Archæological Institute (1874), which was followed by the American School of Classical Studies (1882), the British School (1886), and a branch of the Austrian Archæological Institute (1897). Italy, Russia, and Denmark have also made provision for their archæologists who desire to study in Greek lands. Through the aid of foreign archæologists many of the most important excavations in Greece and Asia Minor have been made possible. Thus, the Germans have excavated Olympia (1875–81), Pergamon, Priene, and Miletus; the French, Delos and Delphi; the Americans, Eretria, the temple of Hera, near Argos (1892–95), and Corinth (see HERÆUM; CORINTH); the British, Megalopolis and Melos, and the Austrians, Ephesus. Side by side with the foreigners, has worked the Greek Archæological Society (Ἑλληνικὴ Ἀρχαιολογικὴ Ἑταιρία, *Hellenikē Archaiologikē Hetairia*), founded in 1836, and always one of the most active agencies in the exploration of Greek soil. To it is due the excavation of the northern and southern slopes and the summit of the Acropolis, the great sanctuaries of Eleusis, Epidaurus and Oropos, and the palace and many graves at Mycenæ (q.v.).

In Italy the progress of discovery has been somewhat limited by a refusal to permit foreigners to engage in the work; but archæological study flourishes not only among the Italians, but under the direction of the German and French Institutes and the American School established in 1895.

As may be inferred from this brief outline, archæology is an eminently progressive science and in all its departments subject to constant revision. The steady increase of material and the filling of gaps in the general structure, as well as continual correction or rejection of hastily formed theories and insufficiently supported conclusions, will occupy savants for generations to come. We can deal only provisionally with the most certain and generally accepted data, supplementing the statements of ancient writers, by the monuments and interpreting the monuments in turn by our literary sources.

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most important is the old series of the German Archæological Institute; *Annali* and *Bolletino dell' Istituto di Corrispondenza Archeologica* (Rome, 1829–85), and the *Monumenti inediti* (12 vols. and supplement, Rome, 1829–85; Berlin, 1891); *Archaologische Zeitung* (Berlin, 1843–85) which has been succeeded by the *Jahrbuch des kaiserlich deutschen archäologischen Instituts* (Berlin, 1885 ff.). Other important periodicals are the *Mittheilungen des kaiserlich deutschen archaologischen Instituts, Athenische Abtheilung* (Athens, 1876 ff.); *Römische Abtheilung* (Rome, 1886 ff.); *Antike Denkmäler*, folio (Berlin, 1887 ff.); *Jahrbücher des Vereins der Altertumsfreunde im Rheinlande* (Bonn, 1842 ff.); *Compte Rendus de l'Academie des Inscriptions et Belles Lettres; Monumenti Antichi dei Lincei; The Year's Work in Classical Studies.* For the Roman antiquities of Germany, *Archäologisch-epigraphische Mittheilungen aus Osterreich* (Vienna, 1877–97), superseded by *Jahreshefte des österreichischen archaologischen Instituts* (Vienna, 1898 ff.). In French, *Revue archéologique* (Paris, 1884 ff.); *Gazette archéologique* (Paris, 1875–89); *Bulletin de correspondance hellénique* (Athens, 1877 ff.). In Italian, *Monumenti antichi* (Milan, 1889 ff.); *Notizie degli scavi di Antichità* (Rome, 1876 ff.). In Greek, *Ἐφημερὶς Ἀρχαιολογική, Ephēmeris Archaiologikē* (Athens, 1837–60, 1862–74, 1883 ff.). In English, *Journal of Hellenic Studies* (London, 1880 ff.), *Annual of the British School in Athens* (cf. Annual), *the British School in Rome*), and *American Journal of Archæology* (Baltimore, Boston, Princeton, Norwood, 1885 ff.). The American School of Classical Studies at Athens has published volumes of papers (1885–97) and the British School an *Annual* since 1895.

For our purpose we may divide the general subject of classical archæology, from an historical point of view, into the following periods:

I. Neolithic Period from about 10,000 B.C. to 3315 B.C.

II. Minoan, or Ægean Period, from 3315—the time of the first dynasty of Egypt (?), to 1450 B.C.

III. Mycenæan Period, from c.1450 B.C. to the Dorian conquest, c.1200 B.C.

IV. Earlier Hellenic Period, from 1200 B.C. to the era of the Persian Wars, c.500 B.C.

V. Period of Hellenic Ascendency, from c.500 B.C. to the Macedonian supremacy, c.350 B.C.—the period of Phidias and Praxiteles.

VI. Period of Hellenic Dissemination and Decline, from c.350 B.C. to the Roman conquest, c.150 B.C.—the period of Lysippus and of the Rhodian and Pergamene schools, so called.

VII. Roman Period, from c.150 B.C. to c.150 A.D. or later—the period of the union and united achievement of Greek and Roman civilization. For convenience, the consideration of Roman art, properly so called, will be reserved to the last period.

I. **The Neolithic Period.** The beginnings of this period in the Eastern Mediterranean are only tentatively dated by evidence deduced from the finds at Cnossus in Crete (see later). But it does not seem fantastic to give the tenth millennium B.C. as perhaps approximately the correct date for the starting point of this period. Its termination is marked by the introduction of bronze, and this metal probably came into use in the Ægean in the neighborhood of the close of the fourth millennium B.C. This primitive culture was of longer duration in some places than others: in Cyprus it lingered on until a fairly late date. Remains of this period have been discovered in the second city so called, at Troy, on the Acropolis at Athens, at Tiryns, and in many of the Ægean Islands such as Amorgos, Syros, Sophnos, Naxos, Paros, and in Thera and Melos. The pottery is the most common type of remains from this period. It is hand-made with decorations as a rule consisting of incised lines at times filled with some white substance. The color of the ware produced by firing is usually gray or red; the surface is hand-polished. Besides the pottery particularly characteristic are the rude "idols," either of clay or stone, which represent commonly a nude female. By some this type of statuette has been associated with the cult of the great eastern goddess Ishtar, or Astarte. The burials of this age are in cist graves. See MELOS; SANTORIN; TROY.

In the West this period is represented by the pre-Sicel, and first Sicel graves in Sicily, and the earlier remains of Italy. The developments of the Bronze Age in Italy are independent of the Mycenæan Period. The products of Mycenæan art reached the West only as importations, apparently late and in small quantities.

II. **Minoan, or Ægean, Period.** The period of Eastern Mediterranean culture which has here been termed Minoan, or Ægean, derives its name "Minoan" from the fact that the chief seat of this civilization, so far as is known at present, was located at Cnossus in Crete, and from the additional fact that Minos was the legendary King under whom Crete rose to the position of thalassocrat of the Eastern Mediterranean. The name "Ægean" has been added as an alternative perhaps to be preferred because the same culture which manifests itself in Crete has been discovered to have existed in other islands of the Ægean, and the name seems more appropriate than the more local one of Minoan. One other name, Carian, had been recently put forward as the proper designation of this culture; but the evidence for the acceptance of this name, as will be seen later, does not appear to be very strong.

Up to the time of Schliemann's discoveries at Mycenæ in 1876, knowledge of the inhabitants of the Greek mainland and the islands of the Eastern Mediterranean who lived there back of the fifth century was largely derived from literary sources. With the opening of the wonderful shaft graves of the acropolis at Mycenæ, the discovery of the great tholos tombs there and elsewhere in Greece, and the uncovering of the palace and citadel of Tiryns, a vista was opened up which reached several centuries beyond the time of the Dorian invasion. So much did the evidence presented point to Mycenæ as the seat of this culture that, in spite of the fact that remains of the same civilization were found widely distributed over Greece, the name "Mycenæan" was attached to it. The assumption was even made, and at the time with much show of reason, that it was from the mainland of Greece, and particularly from Mycenæ, that this culture spread to the islands. For the reason, furthermore, that this same culture was the only one known to antedate the coming of the Dorians, the custom established itself of designating as Mycenæan the whole period from the time of the arrival of this folk back to the close of the Stone Age.

In 1900, however, Dr. A. J. Evans began a series of excavations at Cnossus in Crete, which have been followed by others of various scholars in that island and elsewhere, notably in Melos, and which made it clear that the name "Mycenæan" as applied to the culture of the Eastern Mediterranean of the second millennium before our era was a misnomer. At Cnossus the distinguished English scholar found traces of an unbroken continuity of occupation extending from a time well in the Neolithic Age down to the last years of the second millennium B.C. At this latter date a disturbance occurred which argues for the intrusion of a stock from elsewhere, probably from the Greek mainland. From these same excavations it was also learned that what had been regarded at Mycenæ as the choicest expression of its culture here at Cnossus followed the real florescence of Cretan life and represented in reality a decadent stage of culture. For this reason Evans felt justified in considering the civilization shown at Mycenæ as a late form of Cretan culture. This view, as will be seen presently, is not exactly correct.

It is true, nevertheless, that the finds at Crete and Melos, to mention no others, render it imperative that the name "Mycenæan" be lifted from the civilization belonging to the greater part of the second millennium B.C. and the two millenniums before that, and that some other name be substituted. While it is true that the name "Minoan" has many arguments in its favor on the grounds of picturesqueness and tradition, perhaps it would be better to use the more general one of "Ægean," which makes it clear that this culture was not confined to Crete, but diffused throughout the Ægean Sea. The name "Carian" may be disregarded until the question of the origin of the people who produced this civilization is considered.

Disregarding the Neolithic Age in the Ægean basin, which has left almost nothing behind but stone implements and rude pottery, the makers of the Minoan or Ægean culture were a people who from first to last moved forward to a high plane of civilization. At Cnossus and Phæstos in Crete the remains of great palaces have been uncovered. At Cnossus the excavations have shown a great engineering people who were capable of building intricate structures, who understood drainage, and actually supplied the building with a latrine quite modern in its arrangement. The walls of the palaces at Cnossus (for there were two—one built upon the remains of an earlier structure) were decorated with frescoes which show that the people who dwelt here lived in luxury in a highly organized and even mannered society.

The questions therefore at once arise: when did these people live, were they autochthons, and, if not, whence did they come? An attempt will now be made to answer these questions.

First, as to the dating of the Minoan Period; of the nine divisions into which, for convenience of classification, Evans has separated the Minoan Period, the stratum representing the first —i.e., the stratum following immediately after and resting upon the last of the Neolithic deposit—was found to contain black, hand-polished pottery which, on the authority of Petrie, is not to be distinguished from certain vases found in tombs of Egypt dating in the first dynasty. This discovery to a certain extent defines the beginning of the Minoan Period; for according as one accepts Petrie's dating, 5510 B.C., for the first dynasty, or that of Lepsius, 3892 B.C. or that of Meyer, 3315 B.C., the beginning of the Minoan Period will reach back to 5510 B.C. or come down to as comparatively late a date as 3315 B.C. Evans himself, perhaps by way of compromise, elects 3892 B.C. as correct. It is best perhaps to be even more careful still and accept the more conservative date 3315 B.C. as given by Meyer. For the chronology of later periods Egypt has again afforded material. In a tomb containing seals which bear the cartouches of Senusert II and Amenemhat III (both kings of the twelfth dynasty) were found polychrome vases characteristic of the second division of the second trio of periods which Dr. Evans has classified as middle Minoan. This would mean that the middle of this period is to be located probably in the nineteenth century before our era. Meyer gives 2000–1800 as the time of this dynasty. It is this middle Minoan Period which saw the arrival of the first age of bronze in the Eastern Mediterranean, and it is in the middle of it that the palaces of Cnossus and Phæstos were built. The third division of the middle Minoan Period, in which comes the florescence of Minoan culture and the erection of the second palace, appears to be dated by the discovery at Cnossus of a diorite figure belonging to the twelfth dynasty (which, according to Meyer, begins with the year 1788 B.C.) and by the finding of a vase bearing the name of the Hyksos King Khyan. The time of the supremacy of these invaders of Egypt seems to have lasted from the eighteenth to the seventeenth century B.C. The middle period of the next division, Late Minoan, is synchronized with the eighteenth dynasty of Egypt (which began 1580 B.C.), and it lasted down to the year 1450 B.C. The last period of Minoan culture at Cnossus includes the time of the eighteenth and the nineteenth dynasties, or, in other words, the time between 1450 and 1200 B.C. This is the moment, so to speak, when the hegemony of the Eastern Mediterranean passed from Crete to the Greek mainland; it is the period which, from the great discoveries of Schliemann at Mycenæ, has been and may properly be called Mycenæan.

In a word, there is reason to believe, on the most conservative grounds, that the period of Minoan culture reached with unbroken continuity from about the fourth millennium B.C. to the neighborhood of 1200 B.C. How far beyond the fourth millennium it may be assumed these people lived here during the Neolithic Age is not certain. But one might postulate perhaps, without too great a risk, a date somewhere in the neighborhood of 10,000 B.C. as that which marked the arrival of the first dwellers on the site at Cnossus. From that time until practically the beginning of the first millennium B.C. there is evidence for the continuation, with certain vicissitudes, of the same race as occupants of the site. This must be taken into consideration during the endeavor to discover whether or not the culture of the Ægean in those early days was autochthonous or alien.

The question now arises whether these people are indigenous or invaders. In answer it may be noted that, in Greece proper, in the Ægean, and particularly in Crete, as well as in Asia Minor, certain pre-Hellenic features appear in Greek speech seemingly having no relationship with Aryan or Semitic sources. If this means anything, it is that in pre-Hellenic days in this

part of the Mediterranean there was in use a pre-Greek speech which had no affiliations with the Aryan or Semitic tongues. Moreover, as Mackenzie argues (see "Cretan Palaces," *Annual of the British School in Athens*, vol. xii, pp. 216 ff.), since the origins of writing in the Ægean can be traced back to a period close to the fourth millennium before our era, there must have been a unity of language in this quarter which, in its turn, would speak for a racial unity. In other words, there seems to have been, at least in Minoan times, one race occupying the mainland of Greece and the islands of the Ægean.

That Caria could have been the original habitat of this race is unlikely, for, rather than bringing any influence into the Mediterranean, Caria, on the contrary, received influences from the Mediterranean, and even then not until the period of Mycenæan supremacy.

Two other sources have been suggested as those from which this Ægean, or Mediterranean, race may have come, viz., the north and the south. Phœnicia may be disregarded in any serious consideration. Fortunately for the solution of the problem, the remains from the Minoan Period are sufficient to afford means for arriving at a possible answer.

In the first place, while anthropometry is not infallible, the majority of the measurements of skulls of the earlier Minoan Period in Crete show the race as a whole to have been dolichocephalic. That some skulls are mesocephalic and a fewer number still are brachycephalic may simply indicate that certain contaminations were beginning to creep in. The race, moreover, was black-haired and of a dark complexion. If this people had been of northern origin, perhaps one might have expected to find some indication of fair hair and of broad skulls.

To approach the matter from another side, it is interesting to note that Mackenzie (see above) has shown most convincingly that the loin cloth, which is so distinctive a dress of the Minoan man, is the normal costume of a habitant of a warm climate. If therefore it is worn so constantly by the Minoan men, and it can be shown furthermore that the elaborately flounced dress of the Minoan women is only an evolution from the loin cloth, the only apparent explanation for its use by the Minoans is that the Ægean man must have brought it with him from his original home into a colder climate; for it is not likely that so light a costume would have been developed in a locality which, like the Mediterranean, demands some warmth in clothing. That he did cling to his original form of dress is to be explained by the fact that people are slow to adopt new costumes when moving out of their normal environment. The northerner, for example, who finally found his way into Greece from the cooler regions of the north continued to wear the tunic or shirt which he had found so necessary in his original home. The loin cloth, on the other hand, was the persistent form of dress in Crete worn from the beginning of the middle Minoan Period to the time of the end of the later Palace Period. It is, furthermore, the regular male attire in Egypt from the time of the earliest dynasties downward. It is therefore more than probable that the continuation of this form of apparel in Crete, which is a type of dress so characteristic of Egypt and appropriate to it as a warm climate, affords sufficient reason for supposing that its presence in the Mediterranean means that the wearers brought it with them when they migrated perhaps from this warm country to a colder environment. On the other hand, those who adhere to the northern-Achæan theory for the origin of the Ægean people are compelled to explain how it is that upon the appearance of this folk upon the shores and in the islands of the Ægean Sea it elected to wear a style of dress not only unfamiliar to them in their original home but appropriate only to a warmer climate than that of Greece and the adjacent islands.

Finally, the type of palace in use with these people speaks rather for a race which moved northward than for one which had migrated in a southerly direction. So it is that the type of palace found in the late Minoan Period, which is identical with the contemporary Mycenæan type of the Greek mainland, is distinguished from the earlier form of palace by the introduction of a central hearth in the hall, or megaron. In other words, the earlier palace at Crete, without a hearth, is a type appropriate to a warmer climate, whereas the form which appears later on at Crete, Melos, and Tiryns, and was the one apparently developed by people of the same stock which had penetrated farther to the north, has, for the sake of meeting the conditions imposed by the cold of the more northern land, introduced a central hearth, in the megaron or hall. The occurrence of this type of building later in Crete seems to indicate that in the late Minoan times, when the Greek mainland conquered Crete, either the conquerors imported this type from their home in Greece or the conquered borrowed from their invading kinsfolk this more appropriately northern form of palace.

There is, then, every reason to believe that the eastern Mediterranean in Minoan times was in close contact with the south. That it owed anything, on the other hand, to the north is much to be doubted. But whether this affiliation is to be understood to mean that the Minoans, so called, or, better, the Ægean people, were to a large extent of Africo-Libyan stock cannot be definitely stated. It is to be noted, however, that in the earlier years of this culture the race is preponderatingly dolichocephalic and that only as time progresses does its character in this direction change until late in the Minoan Period the broad-headed, or brachycephalic, stock predominate. Since the craniological evidence, although not infallible, seems therefore to support at the start Egypto-Libyan relations, it seems reasonable to think that this gradual change in the form of the head means a slow infusion of the broad-headed types from the north.

This dark-skinned, black-haired, long-headed race has been one of great vitality. It has persisted in spite of the various fusions of other people, and it is one capable of great artistic achievement. It is perhaps this stock which is responsible at a later date for the wonderful productions of Greece of classical times.

If, as noted above, architecture was so successfully practiced by the Ægean people, it is quite as true that the handicrafts were successfully prosecuted. The pottery of the best Minoan style, for example, is a style possessing a daintiness of fabrication which loses nothing by comparison with works of classic times. The minor arts in general were quite as cleverly followed,

and it may be assumed that work in the precious metals was also of a high order. But this can be only surmised because of the unfortunate sack of the palaces of Crete by a people who took practically all that was wrought in gold or silver.

The Minoans were, then, a people of a highly matured civilization, using both linear and pictographic forms of writing. (See WRITING.) For amusements the upper classes at least enjoyed boxing contests and bull baiting. At Cnossus is a theatral area that might have well served for some of these events, as they were pictured in the frescoes and by the other arts.

Pastimes, however, did not occupy all their time. Cnossus has furnished abundant evidence which, supplemented by material from other sources, shows that these Ægean people were as distinctly religious as their successors in the Mediterranean basin. So far as can be made out the Minoans worshiped, above all others, a nature goddess whose symbols are sometimes serpents, at others doves—possibly to signify her two aspects as a chthonic and a heavenly deity. With her seems to have been associated a male god who perhaps occupied the indeterminate position of son or consort. This god may have been the divinity whose manifestations were the thunder and lightning, for his attributes were the double axe and the bull's head or even merely the horns. This god may be the one who later in Greek religion appears as Zeus, and who, as a result of the later invaders' worship of a male divinity, usurped the high place previously occupied by the mother goddess. Other divinities, less intelligible, however, were in the Minoan theogony, among whom may be classed the demonic creatures which at times are anthropomorphic and at others zoömorphic. Even inanimate objects, such as trees and betyls, or pillars, seemed to have found a place in the Ægean religion.

This religion apparently was not free from outside influences. There is, in fact, a possibility that the Dove goddess of the shrine found in the palace at Cnossus is to be associated in some way with the Dove Cult of the Syrian Semiramis, or Astarte of the Phœnicians. But there is no way by which it can be determined whether Crete was in this instance the borrower or the giver. So, too, there seems to be reason for associating the fantastic demons mentioned above with certain Egyptian religious types. Even the figure with the sistrum on the Harvester Vase points in the same direction toward Egypt. But whatever was the situation, it is likely that the Ægean religion was primarily indigenous and only tinctured by outside influences.

The painted sarcophagus from Hagia Triada in Crete shows what seems to be the celebration of some religious rite at a tomb, thereby suggesting that in common with other primitive people the Minoans practiced ancestor worship.

Both cremation and inhumation were practiced, the latter custom predominating. This, as well as the fact of three forms of tomb—the tholos or chamber tomb, the shaft, and the pit grave, would seem to hint at the fusion of stock referred to above. The latter type of tomb consists of a deep well from the bottom of which opens a cavity for the reception of the body. Since burial customs are very slow to change, and there is no reason to look for more than one form in a completely homogeneous race, the suggestion lies at hand that these three forms of tomb suggest three elements in the race itself. When they came in, no one can say.

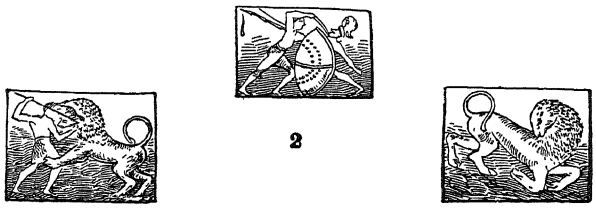
This, then, is the race which dominated the Ægean from practically the fourth to the first millennium B.C. Its forebears seem to have resided in the same area for a period reaching well back to the tenth millennium B.C. What occasioned its blotting out is a question. But so far as can be discerned, Cnossus was sacked at the end of Evans's late Minoan II Period, and Crete itself as a whole together with other places in the Ægean felt the force of the same conquest. If any reason for the disaster may be given, it would seem to be that the gradual movement southward from Europe of northern people led to an exodus, so to speak, from the Greek mainland to the islands of the Ægean of the folk kindred to the Ægean population. This southward migration was not sudden. There are echoes of it in the chronicles of Rameses III (about 1200 B.C.) which speak of the restlessness of the "isles of the sea." It is likely that these waves of discontent which were breaking so faintly upon the shores of Egypt were occasioned by some disturbance at an earlier date. In some cases the incomers in small groups may have blended with the older folk; in other instances, large forces may have entered as conquerors. In either situation the intrusion must have occasioned some disturbance which may have at times expressed itself in migrations of the older inhabitants. In other words, the movements had been going on probably for several centuries, although it was not until the disturbance had penetrated into the Mediterranean that Egypt heard rumors of it. But the final result of these intrusions from the north must have been disastrous to Minoan culture, for after this time the Cretans are no longer distinguished in Egyptian records by the name of Kefti. In place of this appellation other tribal names appear. Gradually Egypt pays less and less attention to the Mediterranean people until from the tenth to the seventh century there is no contact between the two peoples. When at the latter date Greece again resumes relations with Egypt, she has fused into an entity which has produced the Greeks of historic times. The final cause of the blotting out of Ægean civilization in all probability was the invasion of the Dorians. These warriors, armed with iron weapons, soon overran the country held by a bronze-using folk; and the succeeding centuries, from the time of their appearance to the seventh century, were necessary before the invaders could be fused with the older stock into the race known as the Greeks.

It is of this Minoan-Mycenæan culture that the poems of Homer seem to preserve a reminiscence. This does not mean, of course, that all the descriptions in the poems are accurate pictures of the life of this time; for, as a matter of course, the poet nodded, and anachronisms dealing with the culture of his own time slipped in. It is, as a fact, unfair to expect in Homer more than a traditional account of the general conditions of life in the times of which he sang.

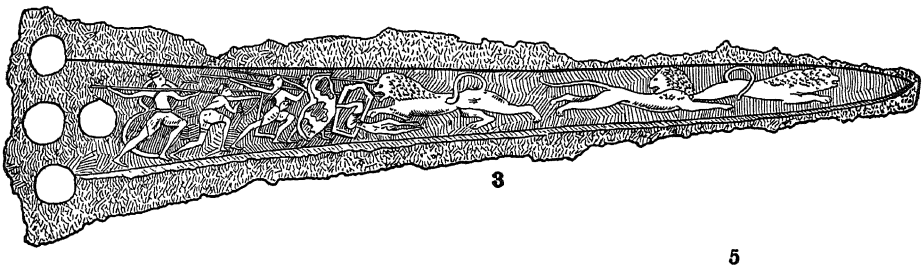
The most complete record of this civilization, as already seen, is to be found in the island of Crete, and especially at Cnossus, where the excavations of Dr. Evans have made it clear that the culture enjoyed there the greatest longevity and the most unbroken continuity. An understanding of this Minoan culture, as it has been



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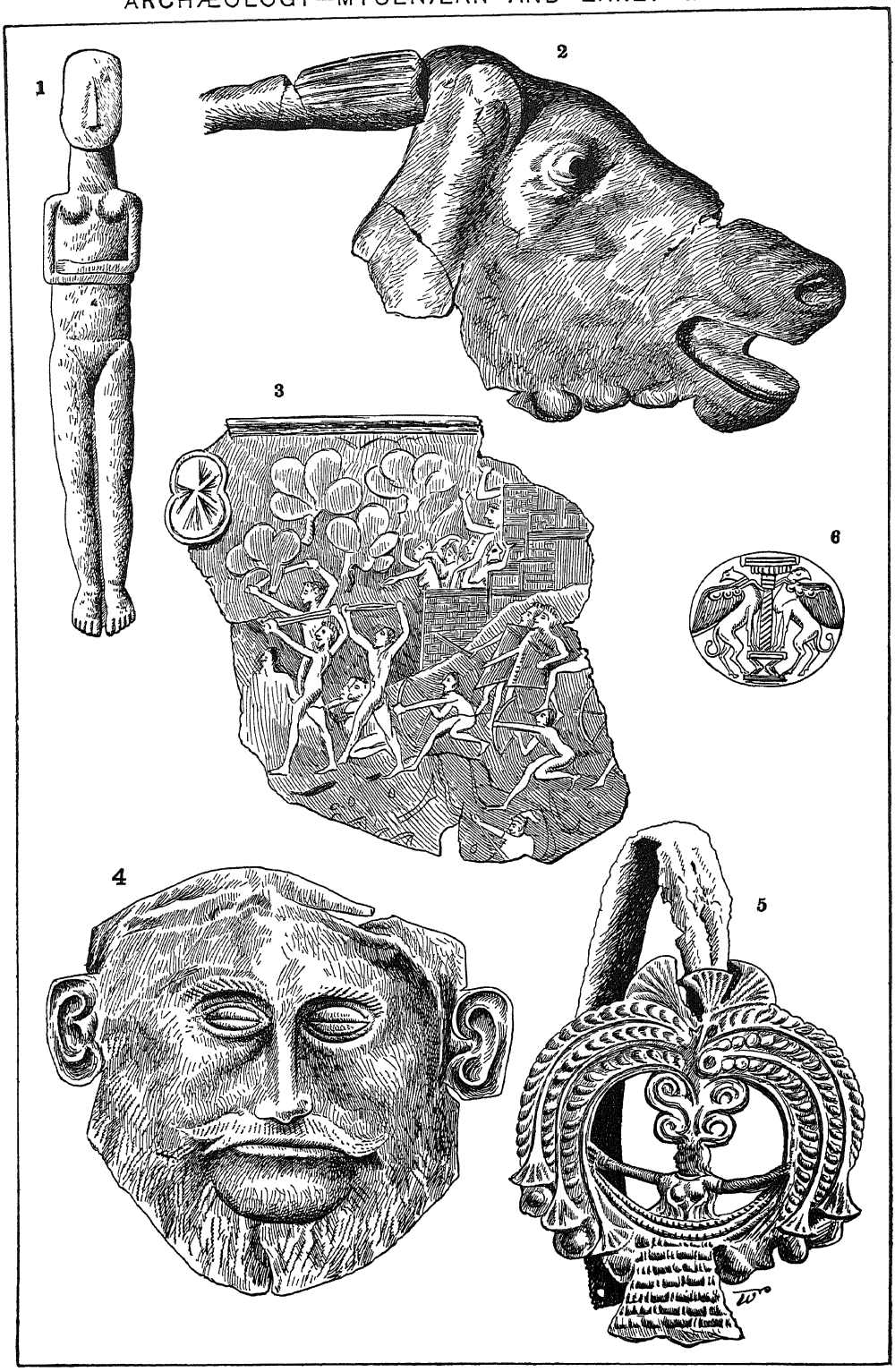
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5

1. THE VAPHIO CUP.
2. GOLD INTAGLIOS.

3. INLAID SWORD BLADE.
4-5. TWO CUPS.




1. ISLAND IDOL.
2. HEAD OF BULL FROM CNOSSUS.
3. SIEGE SCENE FROM SILVER VASE.
4. GOLD MASK.
5. SILVER PIN AND GOLD ORNAMENT.
6. GEM.

called, is best obtained by considering the finds at Cnossus.

On the eastern slope of the hill Kephala, Cnossus, primitive pottery of blackish clay was found, hand-made, hand-polished, and decorated with incised designs filled with white chalk. The same kind of ware was discovered by Schliemann at Hissarlik, and that coupled with the fact that it is always found at Cnossus associated with stone celts, and perforated maces of serpentine and other stone, shows that the civilization we are dealing with is that of a very primitive people. Furthermore, the deposit of yellow clay in which these finds have been made leads to the supposition that the race had advanced no farther than a form of living in which the houses were built of wattles daubed over with wet clay, the disintegration of which gave rise to the deposit already mentioned.

This early civilization lasted down to the period when copper and other metals began to come into use in the Ægean. At this time, without any break in the continuity of occupation—if one may judge from the finds—the people passed from their more primitive state, and began to use painted pottery instead of the polished, incised ware. This pottery, so distinctive of Crete, and called "Minoan" by the discoverers, is characterized by the use of brilliant colors on a shiny black. The decoration is of two kinds—rectilinear and curvilinear —and is usually done in lustreless cream, or cream-white, yellow, orange, red, and crimson, on a slip that runs through gray-brown and to purple-black. The style often shows in the earlier stages a direct translation of the incised patterns of the Neolithic to the painted designs of the Minoan Age. This argues for an uninterrupted transition from the Neolithic into the Minoan civilization.

The people who now turned out the polychrome Minoan pottery became the builders of great architectural constructions. At Cnossus is the same story of superimposition that one reads in the ruins of Hissarlik. An earlier palace rests on the neolithic remains, and on top of this first palace comes another later one. Gypsum blocks denote the earlier parts of the palace, while the later structure is shown by rubble work. This great structure, which might well have been the abode of Minos, ruler of the sea, speaks of a powerful people, whose magnificence must have far excelled that of the princes of Mycenæ. Curiously enough, very little gold has been found; but this is probably to be accounted for by the invasion that seems abruptly to have broken in upon the life at Cnossus.

The later changes that appear in the palace seem to be due to people of the Mycenæan Age. At this time the ceramic style becomes less primitively naturalistic and exhibits more Egyptian influences. The discovery of a small Egyptian figure, dating about 2000 B.C., is of great value in giving the later phases of the life at Cnossus. It was found on top of the neolithic stratum in connection with fragments of "Kamaraes" style, just antedating the Mycenæan. This is a polychrome ware taking its name from its first place of discovery in Crete. At a still later date come the frescoes which show men with vases, who closely resemble the Kefti ('People of the Sea') of the Egyptian monuments of the sixteenth to fifteenth century B.C. Moreover, the roundels found in the "throne room" of the palace approach in style the plaques of Tell El Yehudieh, which date from the early thirteenth century. Inasmuch as this room belongs to the latest period of the palace, we have a definite date for the close of the Cretan-Minoan civilization. The pottery of this time is that of the developed Mycenæan style. Since there is a remarkable absence of remains later than the best Mycenæan period, it is fair to assume that at this date the centre of gravity was transferred elsewhere, probably to the Greek mainland.

The excavations at Cnossus have thrown a deal of light on the question of the Mycenæan, or Homeric palace. Here the building of the ruling prince is grouped around a great central court. On either side of this is a complex of rooms, sometimes grouped around their own halls, sometimes opening out as magazines from long corridors. The building, moreover, shows numerous stories, and in it are many of the conveniences that would conduce to the comfort of its occupants. In a retired part of the building is a series of rooms that seem to have been the private apartments of the prince, and associated with them a bathroom, and a latrine connected by an elaborate system of drain pipes with a sewer that led outside of the building. Elsewhere in the palace is the so-called "throne room" with its *sella*, and bench for the councilors. Opening from the room is a tank, used perhaps for supplying water for some ceremonial rite. The double ax, the significance of which has already been discussed, appears frequently in the frescoes and carved upon the stones of the palace. A shrine devoted to its cult was found in the building. Attached to the palace is a theatre (see above), which seems to have been devoted to such spectacles as the bull fights and boxing matches mentioned above.

Of the artistic development of these Minoans we can form a fair estimate from the numerous wall paintings, the ivory carvings, seals, and the few bits of gold work. The paintings, which are often done with a beauty of facial expression not achieved again for centuries, include the cupbearers, already cited as resembling the figures of the Rekhmara tomb in Egypt, or marine scenes, or a whole field of lilies, with a touch of naturalism in its wind-blown petals.

The discoveries at Cnossus (and the same civilization was found not only throughout the island but elsewhere in the Ægean) point to a highly developed race which, taking its origin perhaps as far back as 10,000 B.C., in the Neolithic Age, lorded it in the eastern Mediterranean before the rise of Mycenæ. Indeed the culture represented by the finds at the latter place seems to point to a degeneration of the Minoan civilization. Perhaps, with Evans, we should call Mycenæan civilization "late Minoan."

III. **Mycenæan Period.** The remains of this period were first brought prominently into view by the excavations of H. Schliemann at Mycenæ, and from this fact is derived the name adopted for this civilization. It is not to be supposed that Mycenæ was the centre from which the art spread, though the characteristic series of vases is more completely illustrated in Argolis than at any other single site. The characteristic products of this period have been found on the mainland of Greece in Bœotia (Orchomenus, Gha), Attica (Athens, Eleusis, Sparta, Thoricus), Thessaly (near Volo), and especially in Argolis and Laconia (Amyclæ): Delphi and the island of Cephallenia have also

yielded Mycenæan remains. It will be noticed that these sites are for the most part in eastern and southern Greece. The same civilization is found on Melos, Thera, Amorgos, and at Ialysus, in Rhodes; other remains are in Crete, which plays a prominent part in the heroic legends, and is now known to have had cities and palaces far finer than anything yet found on the mainland. Troy is also a Mycenæan site, but with this exception Asia Minor has not been brought within the sphere of influence of this culture.

The remains of this period fall naturally into several groups: 1. The fortifications, represented by the walls of the sixth city at Troy, a large part of those of Mycenæ, and especially the well-known wall surrounding Tiryns, as well as the defenses of many other less important sites. These walls are built of huge stones, roughly hewn and laid in clay mortar. In general, there is only one great gate, though there are also smaller gates, or mere sally ports. The gate is flanked by a large tower and is often approached by a narrow and crooked passage. 2. The dwellings, chiefly the royal palaces. The latter are best seen at Tiryns, Mycenæ, and, above all, at Cnossus, in Crete. The usual plan shows a court, on one side of which is situated a great hall, containing the hearth and approached through a vestibule. Around this hall and the court is arranged a complex of lesser rooms, and the whole structure is carefully placed inside the great fortification, which in general seems to have contained little but the residence of the ruler and his immediate dependents. The palace was built of wood and sun-dried brick, but the walls were stuccoed and painted, and metal incrustations and decorations of carved alabaster and glass paste were often employed. The palaces at Cnossus Tiregus have yielded remarkable specimens of wall painting, and the plan at Crete shows a much greater extent than is found in Greece, although it is not as yet (1914) wholly cleared. The smaller houses found in some places, as at Melos, Troy, Crete, and Mycenæ, also show the large hall and its vestibule, but as a rule no further rooms. A house of circular plan, perhaps serving as the prototype of the tholos, or "bee-hive" tomb, has recently been discovered in Crete: in its origin it may possibly go back to the tent form of dwelling. Additional accommodation in the conventional type seems to have been obtained by juxtaposition of unconnected buildings, rather than by a series of connected rooms. 3. The tombs form the third great class of Mycenæan buildings. The most important are the "bee-hive" tombs, of which the most notable examples are those of Mycenæ and the so-called "Treasury" at Orchomenus in Bœotia. These tombs are built of huge, carefully squared stones, laid in regular courses of superposed rings, so arranged that each course projects inward beyond the course below, thus making the interior a dome. The side of a hill is usually hollowed out to receive the building, which is wholly concealed by the replaced earth. The approach is always by a long passage, with side walls of stone, and the façade of the tomb was richly decorated with columns and adornments in colored stone, elaborately carved. The interior was carefully smoothed and apparently decorated with metal plates or rosettes. This type of tomb, although square in plan and elevation, occurs in Crete. In some cases a small side chamber for the dead is found. Besides the great tombs, a series of similar grave chambers, cut in the rock or excavated in the hillsides, and approached by similar passages, shows the common Mycenæan mode of disposing of the dead. Burning seems to have been unusual at this time. 4. It is, however, in the products of its art, even more than in its architectural triumphs, that this period is sharply characterized. The excavation of Mycenæ and Tiryns yielded a series of painted vases, which still occupy a place by themselves in the history of Greek ceramics. Made on the wheel, of graceful form, they are decorated with marine plants and animals, birds, and, in the later work, rude drawings of men and animals. The decoration is by means of a "glaze" paint, varying from brown to black, or under intense heat becoming red. (For details, see VASES.) Even more marked are the gems and gold work of this time. The drawing is often rude, but the spirit and vigor are astonishing. The gold cups of Vaphio (see Plate), with scenes in relief representing the capture and taming of wild bulls, show an art uncontaminated by the influences of Assyria and Egypt, and at the same time distinguished by the spirit which marks the later Hellenic products. It is an indigenous, Ægean outgrowth. More foreign in technique and decoration are the sword blades, inlaid with scenes of hunting and wild life, which much resemble objects found in Egyptian tombs. If we omit the purely ornamental spirals and other motives forming part of the decoration of the façades of buildings, of larger works of art, the lions over the gate of Mycenæ, and the rudely carved slabs which once marked the site of shaft graves, were for a long time the only representatives. Crete, however, has yielded reliefs of bulls and other sculptures which show that the Ægean art did not confine its skill to small objects only. Space does not permit a detailed description or even a list of the Minoan and Mycenæan works; they may be found fully illustrated in the published works mentioned below.

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IV. **Early Hellenic Period.** The dark age, from the Dorian invasion to the rise of sculpture in the seventh century B.C., is bridged, from an archæological point of view, chiefly by the painted vases, the earliest varieties of which have been already mentioned. It seems clear that we are now in the presence of a new element, and nowhere can this be better studied than in the pottery. The whole style of ornamentation is changed. Gold ornaments are much rarer. The prevailing decoration, not merely on vases, but on metal ornaments, is the "geometric," i.e., meander patterns, circles, and various combinations of straight lines. Instead of the Age of Bronze we now find the Age of Iron. The artistic situation thus well agrees with the overturning of the old Achæan kingdoms by the invading Dorians, as pictured in Greek legend.

The funeral urns and other representatives of the so-called "Dipylon style" (from the Dipylon gate of Athens, near which in ancient tombs the finest specimens of this class have been discovered) appear to extend over a period from about 1000 to about 700 B.C. at latest. The patterns upon this pottery are "geometric," derived apparently from weaving and textile fabrics, rather than from nature, as in the Mycenæan ware. The human and animal figures upon them are eminently schematic and conventional. Pictures of nautical scenes (sea fights and the like) and funeral processions are prominent. The figured examples seem to have been introduced later than those with merely a geometric pattern, though this style continues in use till the end. It is not improbable that Athens was the chief seat of its manufacture.

The Mycenæan influences seem to have survived on the islands and the Asiatic coast, where also the connection with the Orient was maintained, and in consequence we find in these regions the development of a number of local types, all strongly influenced by Oriental motives and yet with well-marked peculiarities. The favorite decoration is with rows of animals; lions, boars, panthers, cattle, deer, as well as griffins and sphinxes, appear, either in procession or grouped heraldically. By the seventh century these have crowded back the geometric types, and, further, the merely ornamental decoration begins to give place to actual scenes, either of daily life or from the legends of the past. For the pottery, see VASES.

About the opening of the seventh century begins the class of Corinthian vases still at first strongly Oriental, but later exhibiting the mythological scenes. The commercial importance of Corinth during the seventh and sixth centuries gave this ware a wide distribution, and many of the best specimens have been found in Italy. Chalcis also developed a local style of wide distribution, and both Corinth and Chalcis contributed to the formation of the Athenian style, which, taking its rise early in the sixth century B.C., as the result of a gradual transition from the Dipylon methods rapidly became so popular as practically to drive out of the general market all other styles. The reddish color of the clay was artificially heightened, and the decoration was applied in a very lustrous black glaze, relieved only by the occasional employment of purple, red, and white. Toward the end of the sixth century a new style, the "red-figured," begins to displace the "black-figured" technique. Here the body of the vase is covered with the black glaze, the figures being left in the color of the clay, while details are represented by fine black lines. The greater delicacy which this style made possible brought it at once into favor, and in it were executed the great masterpieces of Greek ceramic art.

Painting in Greek archæology can hardly be separated from ceramics, architecture, and sculpture before the time of Polygnotus (fifth century B.C.). We therefore take up next the consideration of these two latter developments, in brief outline, referring for details to the special articles on GREEK ART and ARCHITECTURE.

The history of the origin of Hellenic architecture rests largely upon conjecture and reasoning from analogy. Although in its development, as known to us from existing monuments, we have to deal with it as manifested chiefly in temple-building (private dwellings being of comparatively little account among the Greeks and those known dating from comparatively late times), it is plain that we have to seek for its primitive principles in domestic structures, which were of

wood and sun-dried brick. It is during this period that the temple forms became fixed, and the oldest stone buildings were erected, though the full perfection of architecture is not manifested till the fifth century. The point, however, which chiefly concerns us in this place is the rise of the two great orders, the Doric and the Ionic, connected, as their names imply, with the two great branches of the Greek race, the Dorians and the Ionians. One of the distinguishing marks of these orders is the form of the columns employed; and it is to these that we must turn our attention here, leaving the discussion of the several varieties of temple, whether *in antis* (with the front recessed and columns between the projections of the side walls), prostyle (with columns across the front), amphiprostyle (with a front at either end), or peristyle (surrounded by columns), as well as the details of the architrave and roof, for another page.

The Doric column, which we find to have been employed in the Heræum at Olympia, in the old temple at Corinth, and in those of Selinus, as well as in other buildings of this and the succeeding periods, is traceable at least to the seventh century B.C. It is characterized in general by the absence of a distinct base (though this seems clearly to have been an original element of this species of column), by an outward sweep at the top called the echinus, and by a square plate (the abacus) between the echinus and the architrave, as well as by the fact that the edges of the fluting (q.v.) are sharp, and not flat, as in the Ionic. The nearest prototypes of this form of column, which is marked, particularly in the oldest examples known to us, by great heaviness of proportion, seem to be Egyptian, although Doric architecture offers a new element in the *entasis* (or slight bulge) in the shaft, which serves to correct a familiar optical illusion of concavity.

The Ionic column, on the other hand, which is of lighter and more ornamental design, has always a distinct base, with a succession of moldings above it, while the grooves in its shaft do not meet in arrises, but are separated by flat bands. Its chief point of interest, the capital, consists of double spirals, parted in the earlier forms by a palmette device. On the origin of this form of capital much has been written; although the question is not as yet settled, it seems likely that the Ionic capital goes back to an Oriental prototype, whether a conventionalized Assyrian palm form or a derivative of the Egyptian lotus. Consult *American Journal of Archæology*, 1886, pp. 1–20, "A proto-Ionic Capital," by J. T. Clarke; id., pp. 267–285, "A Doric Shaft and Base Found at Assos," by the same author (there is a full bibliography in both articles); Goodyear, id., pp. 271 et seq. (an attempt to derive all palmette as well as lotus patterns from the Egyptian lotus, cf. id., *A Grammar of the Lotus*), and especially Puchstein, *Das ionische Capital* (Berlin, 1887).

The Corinthian capital, with its acanthus leaves, so extensively used by the Romans on account of its more elaborate character, may be considered a variety of the Ionic influenced by metal work. It does not come into use until the next period, and was never very common until after the fourth century B.C. (Cf. Baumeister, op. cit., the article "Baukunst," with the authorities there cited.)

While in painting, metal work, and architecture it is possible to trace the connection with the Mycenæan Age, in sculpture the line seems abruptly broken. It is not till the latter part of the seventh century B.C. that monumental sculpture, whether in the round or in relief, again begins to develop among the Hellenes. We find shapeless fetiches of wood and stone venerated in various parts of Greece down to the second century A.D. and later. A step beyond this primitive worship brings us to rude cultus statues of wood and stone. We should expect the same Oriental influences to manifest themselves here as in the case of ceramic art; and when we look to the early statues themselves, such as the various so-called Apollo-figures of the seventh and sixth centuries (typical is the famous "Apollo of Tenea," in Munich), we seem to find unmistakably Egyptian elements. The frontality of the figure, the heavy masses of hair, the high set of the ears, the advancement of the left leg in such statues are unmistakable reminiscences of Egyptian works, with which the Greeks were especially brought into contact about this period. On the other hand, statues like the "Nicandra" of Delos, the "Hera" of Samos, and other closely draped female figures, with the feet just appearing below the drapery, may be compared with the seated statues from Branchidæ, in the British Museum, and with what seem to be their older Chaldæan prototypes from Tello. The closely draped standing female figures show markedly the influence of sculpture in wood; either from the flat board, as the "Nicandra," or the round log, as the "Hera." Such works are frequently spoken of as *Xoana*. Though the inspiration for these types may have been derived from the Asiatic connections of the Ionians, and the trade with Egypt through Naucratis, the Greek artist was by no means a mere imitator, but early began to strive after development and variety along many lines.

The series of works of archaic sculpture from the period under discussion has rapidly increased through recent excavations, and we are able to trace with tolerable clearness the attempts made by the vigorous Greek artists to gain increased naturalness and lifelikeness in their figures, while gradually acquiring the full mastery of material and technique requisite for the free exposition of the sculptor's ideal.

To the opening of the marble quarries of Naxos and Paros we owe much. The marble thence obtained is a wonderfully fit material, easily worked, and in its very hue imitating human flesh. The earlier material had been wood or coarse limestone, the so-called "poros," which could not be finely carved, and needed to be painted in order to show details. The early marble statues show that the technique of wood carving, easily available for the softer "poros," was at first used for the new and harder material, and at all times color was largely employed in Greek sculpture.

Of inestimable value for the study of the sculptures of this period are the archaic statues discovered on the Acropolis of Athens, which undoubtedly antedate (how much we cannot say) the Persian invasion of 480 B.C. The tyranny of Pisistratus in the sixth century formed an epoch in the artistic as well as literary life of Athens, only to be paralleled by the Periclean Age. Material and style show that we have to do with various schools, partly the marble sculptors from the islands, partly

the native Attic artists, developing along the lines of the heavier "poros" style, but largely influenced by the more delicate and elaborate Ionian developments. For an account of the painted decoration of some of the female statues, consult an illustrated article by Russell Sturgis, in *Harper's Magazine* for September, 1890.

But the development of the period was not confined to Attica alone, nor merely to sculpture in the round. The pedimental groups of the gigantomachy from the Megarian treasure-house at Olympia, and of "Heracles and the Hydra" from the Acropolis of Athens, wrought in high relief from poros, a sort of tufa, and, like all such work, stuccoed and painted, are also of special note, together with the early metopes of Selinus in Sicily; while the elaborate grave stelæ of the wrongly so-called "Marathon Warrior" type, with complete polychrome decoration supplementing the details of the bas-relief, are the forerunners of the exquisite monuments of the Ceramicus to be mentioned hereafter. To this period also belong the Æginetan marbles (see ÆGINETAN SCULPTURES) and the reliefs from the treasuries of Cnidus and Athens at Delphi.

Figures like the "Winged Victory" of Archermus, and the sphinx, if not also the lion, show the influence of the East, particularly of the Asiatic Orient, in the sculpture of this epoch. But we feel, in contemplating the Acropolis statues, that we are on Greek ground and that the artists are rapidly bringing in a nobler native art.

We have hardly entered upon the list of these important monuments; but it must suffice to have indicated in some degree their relations.

We now pass to the mention of the kindred class, bronze works.

Together with the rude terra-cotta dedicatory figurines of early workmanship, we find also many small bronzes, which exhibit a gradual development from the rude and primitive to the delicate and refined. An elaborate and truly remarkable technique, however, is manifested in such consummate works of archaic Greek art as the bearded bronze head found on the Acropolis, or the similar head of Zeus from Olympia. The art of hollow casting in bronze, long known in Egypt, seems to have been brought to Greece by Samian artists and by the end of the sixth century was adopted for larger works. Ægina early attained fame for its artists in bronze, of whom Onatas was the chief, and the influence of this technique, with its sharp lines and fine engraving, is plainly seen in the marble sculptures of the Æginetan temple. The new art came to be regarded as more noble than the cutting of marble, and was especially cultivated in the Argive and the Sicyonian schools.

To the period under discussion belongs another development in metal work, viz., the minting of coins. The earliest coins, properly so called, seem to date from about the beginning of the seventh century B.C., and to have been struck by the Lydian monarchs (possibly first by Gyges). Their material is electrum, or 'white gold,' a native alloy of gold and silver, in about the proportion of three to one. Phidon of Argos, a tyrant of uncertain date, but not earlier than the seventh century, is said to have been the first to issue coins among the Greeks, Ægina being the seat of their mintage. The name "tortoises" was bestowed upon them from the figure on the obverse, the reverse (which was the side struck by the upper die in minting) having upon it the familiar "incuse-square," or punch-mark so prevalent in archaic coinage.

In Greece proper sprang up, subsequent to the Æginetan, a coinage at Corinth, the so-called "colts," from the Pegasus on the obverse, and at Athens the so-called "maidens," or "virgins," from the Athena-head of the obverse, also called "owls," from the type of the reverse. We see in all these types a sacred symbolism, which continues unbroken in coinage till the Macedonian Period.

The greatest Greek cities in this early period were the Achæan colonies of Magna Græcia, foremost among which was Sybaris, afterward overthrown by her great rival Croton. The coinage of the Achæan Confederacy, which seems to have existed in this region, is far superior in artistic workmanship to that of eastern Hellas, and is distinguished by having, instead of an incuse square on the reverse, an incuse type, generally the same as that of the obverse (Poseidon, bull, boar, etc.).

Sicilian coinage, notably that of Syracuse, which in the fifth and fourth centuries reached so high an artistic position, also began in the sixth century.

All the coinage here mentioned, except the Lydian, is of silver. For a full discussion of ancient coins, with exhaustive bibliography, consult Head's *Historia Numorum* (Oxford, new ed.); also particularly Percy Gardner's admirable *Types of Greek Coins* (Cambridge, 1883), and G. F. Hill, *Greek and Roman Coins*, (London, 1899). The period here outlined corresponds to Head's archaic period, 700–480 B.C. See also NUMISMATICS.

The minting of money became gradually diffused through the Greek world, so that there was hardly a town of any consequence without a coinage, some towns being known to us only from their coins.

Intimately connected with die cutting is gem-engraving, for the details of which consult the work of Middleton, *The Engraved Gems of Classical Times* (Cambridge, 1891).

V. **Period of Hellenic Ascendency.** The period which we now enter upon is naturally subdivided by that great convulsion of the Greek world, the Peloponnesian War (431–404 B.C.), into an earlier and a later half, in which diverse social and political influences are at work, wherefore it will be of advantage to keep this subdivision in mind. The most noteworthy development of this time for us is that of sculpture and statuary, for the great monuments of the painter's art have irretrievably perished. It must be borne in mind that no hard and fast line separates these Greek periods, such as divides the Mycenæan from the later times. The great development in Greek art is indeed later than the Persian wars, but the germs are in the later sixth century, and many works, which artistically belong to the archaic period, were made after 500 B.C. The same remark applies to all the later periods; the dates given are merely convenient approximations.

In the early part of this period the development of bronze statuary was continued chiefly by the so-called Argive-Sicyonian school. We find Ageladas of Argos and Canachus of Sicyon famous as statuaries in bronze about the end of the sixth century. Gold and ivory (in the famous chryselephantine work) and marble were

more popular in Attica, where the quarries of Pentelicus furnished inexhaustible material. Pythagoras of Rhegium (the author of the limping "Philoctetes"), and Calamis and Myron among Attic artists, the latter famed for his "Discobol" and bronze cow, are the forerunners of Phidias in the development of the great art of the fifth century. Here also belong the sculptures from the temple of Zeus, at Olympia, whose artistic origin has been sought in many schools, perhaps with most probability in Ionia.

Greek sculpture, however, reached its highest ideal development, though not its full legitimate growth, in Phidias, son of Charmides, pupil of Ageladas, of Argos, the superintendent of the Parthenon sculptures, and the artist of the chryselephantine Athena Parthenes, who was as well the creator of the highest anthropomorphic type of Greek religion in the great chryselephantine Zeus at Olympia, of whose calm and marvelous beauty and dignity we can now, unfortunately, gain but feeble conception.

We have noticed Phidias's activity in connection with the Parthenon, but we must not leave unmentioned the other great buildings of the time, the Propylæa, the so-called Theseum, the Erechtheum, the temple at Eleusis, and that at Rhamnus. Meanwhile a like architectural activity was going on across seas in Ionia, Sicily, and Magna Græcia.

Painting as a great and independent art was developed contemporaneously with Phidias, by Polygnotus, of Thasos, whose paintings in the *Lesche* (portico) at Delphi have been fortunately described to us by Pausanias. He must have powerfully influenced the art of the ceramic painters, as we seem to be able to trace in their works. After him may be mentioned Agatharchus, of Samos; Apollodorus, the first painter of pictures in the more modern sense (i.e., on flat, movable surfaces, anciently not of canvas, but of board); Zeuxis, the contemporary of Socrates, whose "Centaur Family" is minutely described to us by Lucian, and Parrhasius, of Ephesus.

The work of the Argive-Sicyonian school was carried forward by Polyclitus. He was the author of the "Doryphorus" (spear-bearer), and "Diadumenus" (youth binding on headband), which are known to us through Roman copies; and he established a canon of proportion characterized by a certain squareness and heaviness.

After the stormy period of the Peloponnesian War we find Cephisodotus and Praxiteles, probably his son, carrying Greek plastic art to its legitimate and logical conclusion and to fullest bloom and perfection. The "Eirene" (Peace) with the baby "Plutus," preserved in Munich, a replica of a work of Cephisodotus, is a gracious and lovely figure; but Praxiteles's marble "Hermes," with the baby "Dionysus," found in the place designated by Pausanias, the Heræum at Olympia, in exquisite sensuous beauty, in perfection of manly strength and grace, and in the combination of the divine ideal with human form, as well as in complete mastery of technique, surpasses all that is left us of ancient art, while the pensive expression of the god's face indicates but too clearly the speculative thought that was undermining the old faith. There is no more perfect image of the period than this marvelous statue. It is to Praxiteles that we are to attribute the development, if not the invention, of languid but not yet effeminate figures, with hand supported on hip, such as the famous "Faun," of which several replicas exist, perhaps even the torso of the original. Praxiteles is preëminently the sculptor of youthful beauty, not merely in man but also in woman, as proved by his famous "Cnidian Aphrodite," inadequately preserved in replicas.

Side by side with Praxiteles must be mentioned Scopas, of Paros, whose art was rather that of the Peloponnesian school, while Praxiteles is Attic. The remains of his work from the temple of Athena Alea at Tegea, though scanty, make it possible to recognize his style in a number of other sculptures, such as the Meleager, the Ares Ludovisi, and a head of the youthful Heracles. These show distinctly his power in "tragic intensity of expression."

To the last half of the fifth and first half of the fourth century we may assign those most exquisite funeral monuments of the Athenian Ceramicus, such as that of Dexileos and the deeply pathetic relief of Hegeso. The early reliefs show decidedly the influence of Phidias, while later the work of Scopas evidently became the model. Indeed many archæologists are disposed to see the actual work of this master in some of the best of these monuments.

Portraiture also began in this period with Silanion, and from this time probably date the beautiful Lateran Sophocles and some of the types of Socrates and Plato. Heretofore the statues set up in honor of men had been ideal in their type rather than a portrayal of the real features of those honored.

The growth of the Attic drama in the fifth century led to the architectural development of the theatre, though most of the theatrical buildings known to us belong at the end of this period or early in the next. For a consideration of the form and development of these structures, see THEATRE.

In ceramics we must consider the Attic development, which in this period is of absorbing interest, and gives us much light on painting on a larger scale, as well as on contemporary manners and customs. The rise of Attic black-figured ware has already been mentioned. As a special form of this we must mention particularly the fine Panathenaic amphoras, with figures of the armed Athena, in which the sacred oil was presented to victors at the Panathenaic games. These vases are interesting as being continued in an archaistic form into the fourth century (cf. Baumeister, *Denkmäler*, article "Panathenaia" and Branchitsch, *Die Panathenaischen Preisampheren*). A special class of peculiarly Attic vases are the beautiful white *lecythi* (oil or perfume flasks), which were interred with the dead, and which exhibit scenes from the burial and also from daily life, exquisitely depicted in colors on the white slip with which the body of the vase is covered. The series begins early in the fifth century, and continues during the fourth, in the variations of style throwing much light on the development of painting, and forming an interesting parallel to the contemporary series of grave reliefs.

In the "red-figured" ware, which far surpasses in artistic merit the black-figured, and of which the rise as a separate variety has already been mentioned, scenes from the myths, while not excluded, yet make room for delightful bits of social and domestic life. In the development of this style the "cylix," or shallow cup on a rather high foot, plays an important part, es-

pecially in the early part of the fifth century, when such masters flourished as Euphronios, Duris, Hieron, and Brygos. Consult Hartwig, *Griechische Meisterschalen* (Stuttgart and Berlin, 1893).

Various grotesque forms of vases, such as the rhyton (in the shape of a head, generally that of an animal), later came into use, and we find numerous examples of the pyxis, or woman's toilet box. But the art gradually sank, and vase painting was fast dying out at the beginning of the Alexandrian Period.

In the domain of numismatics we must briefly mention the periods of transitional art (480–415 B.C.) and of finest art (415–336 B.C.). We have here not to deal particularly with Athenian coinage, which, like the Panathenaic amphoras, keeps a designedly rude and archaic character in order to maintain its position among foreign peoples, with whom the Attic State came in contact through its wide maritime relations and commercial dealings, but rather with such beautiful work as that of the Syracusan die-cutters Euænetus and Cimon, in the period subsequent to 415 B.C., whose splendid decadrachms are justly reckoned among the highest achievements in this branch of art. We may trace, however, through the coins of this entire epoch that same gradual mastery of material and development from the more severe to the more graceful style, which is marked in other lines of art. But coinage still maintains the symbolism which characterized it from the beginning, the purely human and individual element appearing distinctly only in the special marks of magistrates and mint masters, which are kept subordinate to the main design.

VI. **Period of Hellenic Dissemination and Decline.** The development of Macedon under Philip and the conquests of Alexander changed the entire aspect of the Greek world. We have henceforth to consider a Hellenism synonymous with civilization rather than the geographical Hellas with her outlying colonies.

In Greece itself the greatest influence is exerted at the opening of this period by Lysippus of Sicyon, who not only continued the prestige of the Argive-Sicyonian school, but also introduced a new canon in statuary, making the figure more slender and the head proportionally smaller than in the preceding art and forming a marked contrast to the canon of Polyclitus. His work is known to us from copies of his "Apoxyomenos" (a youth scraping himself with the strigil); and a marble copy at Delphi of one of a series of statues of the family of Daochus, of which the bronze originals were at Pharsalia. This is the figure of Agias. Lysippus was also in a way court sculptor to Alexander the Great, as Apelles was his painter. His influence extends immediately to Rhodes in Charles of Lindus, one of his best-known pupils, and artist of the famous "Colossus of Rhodes."

The splendid "Victory of Samothrace," now in the Louvre, which may be dated about the beginning of the third century, is one of the greatest monuments of this period, and deserves to be ranked with such splendid figures as the "Victory of Pæonius of Mende," set up at Olympia a century or more earlier, and with the Victories from the balustrade of the Temple of Athena Nike, at Athens.

The Pergamene art, cultivated especially under the Attalid kings, of which we see such astonishing examples in the frieze of the great altar of Zeus at Pergamon (q.v.), belong to the earlier part of the second century B.C. This represents a colossal gigantomachy and exhibits great mastery of technique, violence of action, and the free expression of physical suffering, of which qualities the latter two belong rather to sculpture than painting. Somewhat earlier than the great altar are the well-known statues of the "Dying Gaul" (miscalled the "Dying Gladiator"), as well as the Gaul and his wife in the Ludovisi Gallery. As intimated above, this is as it were the grand finale of Greek sculpture, in which this art, though overstepping its due bounds, still appears great. To this period also belongs probably the development of the Rhodian school, though some scholars prefer to date the great product of that school, the Laocoön group, now in the Vatican, at the end of the second century or beginning of the first century B.C. To this school in its Asiatic development belongs the "Farnese Bull," the great work of Apollonius and Tauriscus of Tralles.

Single statues which seem to belong to this period, but cannot be assigned with certainty to any definite artist, are the "Aphrodite of Melos," one of the most beautiful works of the later classical art; the "Apollo Belvedere" (q.v.); and the "Torso of the Belvedere," a noble fragment, whose correct restoration, though often attempted, has probably not yet been found. To this period also belongs the full development of genre scenes, though this begins still earlier. Such are the group of the "Boy and the Goose," the "Drunken Old Woman," the "Fisherman," the fine "Old Market Woman" of the Metropolitan Museum of Art, New York City, and especially the large mass of reliefs, which seem to owe their origin to Alexandria and to be the product of the same tendencies which led to the bucolic poetry. Portraiture also flourished, not only in statues and busts of the living, but in ideal portraits of the great men of the past, as Homer and Anacreon.

With the painting of the Alexandrian Period we come more closely into contact than with the earlier art of this kind through the wall decorations of Herculaneum, Pompeii, and Rome, which follow the traditions of this epoch. Apelles (q.v.) of Colophon represents the highest development of Greek painting. His idealized portraits of Alexander were as famous as Lysippus's statues. Protogenes of Caunus, who worked at Rhodes about the end of the fourth century, is also distinguished in this department. Antiphilus at the court of Ptolemy is characterized as "most eminent in facility." But the list of great Greek painters closes with Theon of Samos, of the third century (cf. the article "Malerei," in Baumeister, *Denkmäler*).

Among other species of art we find the eminent gem-engraver Pyrgoteles, employed by Alexander; and this branch of the sculptor's profession, ever excessively popular among the ancients, was fostered by that monarch's successors.

In vase painting we note little else than decline, the latest development manifesting itself in Magna Græcia, Etruria, and Campania. The painted vases of southern Italy, which present a distinctly funereal element side by side with a marked influence from the drama, give us much valuable archæological material. Asteas (of Pæstum?), Pytho, and Lasimus are its only masters known to us by signature. We have also some Campanian vases with Latin inscriptions of the third century. The end of vase-

painting seems to fall about the beginning of the second century B.C.

We may here depart from our chronological order to consider briefly the peculiar ware of Etruria. When side by side with primitive geometric pottery, continued seemingly over a long period, and more or less skillful imitations of Greek painted ware (particularly Attic), we find the so-called *vasi di bucchero*, a peculiar class of pottery of black clay, about which we have but little exact knowledge and of which examples have been found not merely in Etruria, but also in the Orient, in Cyprus, in Greece proper, and on the coasts of the Black Sea. The earliest of such vessels in Etruria are made without the potter's wheel, but in the manufacture of the later (and darker) ware, this was employed. The earliest figures are incised; subsequently relief decoration appears. In the latter case Greek types are employed, at first roughly, afterward more skillfully and with a mold or incised roller. In individual cases polychrome painting occurs. This art seems to have continued into the sixth century.

Before leaving the subject of pottery we must also notice the Megarian relief ware, assigned to the third and second centuries B.C., and the Aretine ware, apparently of the first century B.C. and later. See AREZZO.

In numismatics the new development under Alexander and his successors, designated as "the period of later fine art from the accession of Alexander to the death of Lysimachus" (336–280 B.C.), and marked by the influence of Lysippus, is succeeded by a period of decline in art extending to the Roman conquest (280–146 B.C.). Excellent likenesses of sovereigns, first that of the deified Alexander, then those of other and living princes, make their appearance upon coins, and continue down to the later Roman Empire, giving a valuable series of historical portraits. Gold coinage now begins to occupy a prominent position, and continues side by side with silver and bronze to be a medium of exchange under the Roman Empire.

In the minor arts our attention is particularly drawn to the terra-cotta figurines of this period, particularly those of Tanagra in Bœotia, which in their charming shapes and lovely coloring give us so many delightful pictures of Greek life. Such figures have their origin in very early times, but from the time of Praxiteles, whose style they often reproduce, down to the Roman period and later, they formed a favorite household decoration, and were buried in great numbers with the dead. See TERRA-COTTA.

Bronze mirrors may also be alluded to here before we pass out of the domain of Greek classic art. Of these some most beautiful specimens exist, their lids forming a class of *chefs-d'œuvre* in metal graving, while their handles are often statuettes of finest workmanship.

VII. **Roman Period.** The Roman connoisseurs had a passion for objects of Greek art, but in the period upon which we are now entering certain other elements demand our attention. As among the Greeks the introduction of foreign art was met by a native element, which at first colored and afterward completely overpowered, by the strength and vigor of its own development, external influences, so we find in Italy among the Etruscans, the masters in so much of the Romans, and makers of the peculiar bucchero ware already mentioned, a native element which reacted upon the art from without, though in a much slighter degree than that of Greece and with inferior genius. This Etruscan art was not the oldest in Italy; for we find specimens of *situlæ* (pails) of beaten metal, perhaps to be designated as Umbrian, the decoration of which, while it seems to show certain elements derived through the Greeks, has but little affinity with Etruscan art.

The influences at work among the Etruscans, as we have noticed in the case of their figured pottery, were principally Greek. The native elements were chiefly their sombre religious tendencies, and a marked aptitude for portraiture. We find "realism combined with poverty of style." The chief Etruscan monuments are funereal, consisting of decorated tombs, sarcophagi, and ash urns, upon which Greek ornamentation and Etruscan portraiture are not very happily blended.

The same tendency to portraiture appears among the Romans, fostered by the importance attached to ancestral *imagines* (portraits in wax), which played so marked a part in their funeral ceremonies. Their masters in this were Etruscan artists.

Hand in hand with the art of plastic portraiture, in which Roman artists learned from Etruscan masters, went that of honorary statuary in bronze, which after the Second Punic War were to be seen at Rome in large numbers. Most Romans of any distinction were honored in this way. It was just after this time that their Greek conquests began to bring the Romans decidedly under the sway of Hellenic art.

In architecture the markedly Roman characteristic is the great employment of the arch and its natural development, the vault. The former, although not unknown to the Greeks, was but rarely used by them. These features rendered possible such great works as the aqueducts, to say nothing of the Colosseum, the Pantheon, and the other huge structures of imperial times. In temple construction we find Etruscan influence at work in the earlier period in both form and decoration. Later Greek architecture is combined with native elements in elaborate and luxuriant structures.

The so-called Attic Renaissance in sculpture about the beginning of the period we are now considering, i.e., when Greece had been brought under Roman dominion, introduced no new elements, but carried on with enfeebled ability the old. This revival is best known to us through the "Farnese Hercules," an exaggerated work of which the motive is derived from Lysippus.

The school of the first century B.C., founded by Pasiteles, a native of southern Italy, and continued by his pupil Stephanus, and Stephanus's pupil, Menelaus, deserves mention as exercising somewhat of independent influence. It is characterized by a return to the types and style of the end of the archaic period, but combines them with types and technique belonging to its own time. During this period we also find the growth of the archaistic style, which imitated the stiff drapery, awkward smile, and other peculiarities of the archaic art.

Asia Minor supplied most of the sculptors at Rome in the time of the late Republic and Early Empire. Best known among such is Agasias (q.v.), the artist of the so-called "Borghese Warrior."

From the time of Augustus on, we meet, side by side with a vast importation of ancient

Greek works and reproductions of them in copies, a host of portrait statues and busts, triumphal arches and elaborate public and private buildings of all kinds. A most splendid specimen of Roman portrait-statuary, now in the Vatican, is that of Augustus in general's uniform. In it are admirably combined grand and realistic portraiture and rich decorative effects. Especially noteworthy also are the reliefs of the Ara Pacis Augustæ (q.v.) and of the triumphal arches, such as that of Titus. In these fields of portraiture and historical relief the art of Roman times offers much that shows originality and strength, but in general it is imitative of the Greek. Consult Wickoff, *Roman Art*, translated by Eugénie Sellers Strong (London and New York, 1900), H. B. Walters, *Art of the Romans* (New York, 1911), and E. S. King, *Roman Sculpture* (New York, 1907).

Of idealistic bronze statuary we have a beautiful example in the "Victory of Brescia" of the first century A.D.

The era of Hadrian is the last period of vigorous impulse in art among the Romans. That Emperor's passion for ancient art, both Egyptian and Greek, and his encouragement of new works, both at home and abroad, are well known. To his reign are to be assigned the various idealized portraits of his famous Bithynian favorite Antinous.

In numismatics the last period of continued decline, 146–27 B.C., and that of the coinage of the Roman Empire down to Gallienus (27 B.C. to 268 A.D.) falls in here. The material is vast, and here, too, the element of realistic portraiture is prominent.

The luxury of the Romans manifested itself in the multiplication of elaborate mosaics, rich jewelry, wonderful intaglios, both in stone and in paste, costly glassware and the like. But of all this art, which cannot be fully discussed here, suffice it to say that it involves no new principles. It is merely the bloom of that decay which was fast consuming the ancient world.

Further information concerning single branches of archæological research is presented under the titles of ancient countries. The articles on these countries include the art, monuments, language, religion, laws, etc., of the early inhabitants. Among such articles are: ASSYRIA; BABYLONIA; EGYPT; PHŒNICIA; CHINA; JAPAN; PERSIA; CEYLON and INDIA. For information with regard to the arts of ancient countries, the reader is referred to the series of special articles on ASSYRIAN ART; BABYLONIAN ART; EGYPTIAN ART; BIBLE ANTIQUITIES; CHINESE ART; JAPANESE ART; INDIAN ART; ANGLO-SAXON ART; ETC. More specific information about discoveries at particular places is included under the titles of those places—as, for example, KARNAK; KOYUNJIK; PERSEPOLIS—and under the names of the excavators, such as BOTTA; DÖRPFELD; LEDYARD; LEAKE; PÉTRIE; PETERS; MARIETTE; MASPÉRO; EVANS; SCHLIEMANN; ETC. See further the articles on AGRICULTURE; AQUEDUCT; ARCHITECTURE; ARMIES; NAVIES; BRICK; BUILDING; COSTUME; CUNEIFORM INSCRIPTIONS; GLASS; HIEROGLYPHICS; NUMISMATICS; ROSETTA STONE; AMARNA LETTERS. For biblical archæology, in addition to the general title, see ATONEMENT, DAY OF; BAAL; DAGON; ESSENES; FESTIVALS; JUDGES, BOOK OF; LEVITES; MAGIC; NAZIRITE; PRIESTS; PROSELYTE; PURIM; REMPHAN; RIMMON; SABBATH; SACRIFICES; SADDUCEES; SCRIBES; TABERNACLE; TAMMUZ; TEMPLE; TERAPHIM; URIM AND THUMMIM; VOWS.

**ARCHÆOLOGY, AMERICAN.** The purpose of archæological research is to contribute to the history of man in the world, and of American archæology to contribute to the history of the American race. The principal problems are those of origin, characteristics, and relationships, migrations, geographical distribution, culture history, and chronology. In many respects the western hemisphere forms a distinct archæological field, and one of peculiar interest to the student. In the first place the two great continents, with their insular appendages, form a single ethnic province. From the earliest times the lands were inhabited by a race of mankind unknown to the Old World till the Caucasian discovery, and though the province is vast, yet throughout its extent the tribes and their works bear in a striking degree what may be called the family resemblance. In the second place, the American aborigines, from the Arctic to the Antarctic, were remarkably similar in cultural development. True, some of the tribes discovered by Caucasians represented lower savagery, while others occupied the planes of higher barbarism verging on civilization, yet the cultural range represented by their works is narrower than that of any other important ethnic province except Australia. Furthermore, the aboriginal tribes survived until the spirit of inquiry among the European invaders of the Continent had been developed and until observation and records were well advanced. By reason of the several conditions a distinctive science of archæology has grown up in the western hemisphere. Thus, in America prehistoric artifacts are interpreted in the light of the observed uses of historic examples, recorded by early explorers or studied by present-day investigators. The modern works are interpreted in the light of primitive arts, industries, laws, languages, and faiths, and thus the ancient and the modern, the prehistoric and the historic, the living and the dead, are correlated in a simple yet comprehensive scheme at once coëxtensive with the world's greatest ethnic province and sufficiently definite to outline a considerable part of the early course of human development.

The subject matter of research comprises every material resource from which significant information may be drawn and more particularly the materials of antiquity. These include all remains of man and his works not directly connected with the people of to-day and thus fully explained by that association. The vast extent of the material is indicated by the following partial synopsis:

I. **Human Remains**—mummies, skeletal, and other parts found imbedded in natural formations or variously deposited in tombs, earth and stone mounds, caverns, and simple graves of varied type.

II. **Art Remains**—the work of man's hands developed in stone, metal, clay, wood, bone, shell and other materials; built, carved, woven, modeled, etc.

MAJOR WORKS (fixed). 1. *Inhabited sites*—village sites, middens, towns. 2. *Habitations*—earth, wood, bone, stone, concrete. 3. *Defensive works*—walls, stockades, forts. 4. *Burial places*—graves, mounds, pyramids, tombs. 5. *Religious works*—altars, shrines, kivas, temples, monumental sculptures. 6. *Civic structures*—council houses, kivas. 7. *Diversional structures*

—chunky grounds, ball courts. 8. *Fixed records*—rock inscriptions, pictographs. 9. *Mines, quarries, workshops.* 10. *Agricultural remains*—old fields, terraced fields, canals, aqueducts. 11. *Highways and bridges.* 12. *Storage facilities*—granaries, cisterns, reservoirs, enclosures.

MINOR WORKS (portable). 1. *Implements and utensils*—knives, scrapers, axes, adzes, chisels, picks, hammers, abrading stones, projectile weapons; mortars and pestles, receptacles, textile appliances, lamps, musical instruments, etc. 2. *Recording devices*—wampum, quipu, inscriptions on bark and skins, in books, etc. 3. *Transporting devices*—boats, litters, cradles, sleds, etc. 4. *Furniture*—stools, chairs, tables, benches, beds. 5. *Clothing*—skins, bark, grass, textiles, etc. 6. *Embellishments*—personal and non-personal. 7. *Sacred and ceremonial objects*—totems, talismans, idols, etc. 8. *Problematical objects* (use undetermined).

By the study of this diversified material the archæologist seeks to contribute to the solution of the various problems of the American race. It is impossible, however, to present more than a very brief review of the material in the present connection.

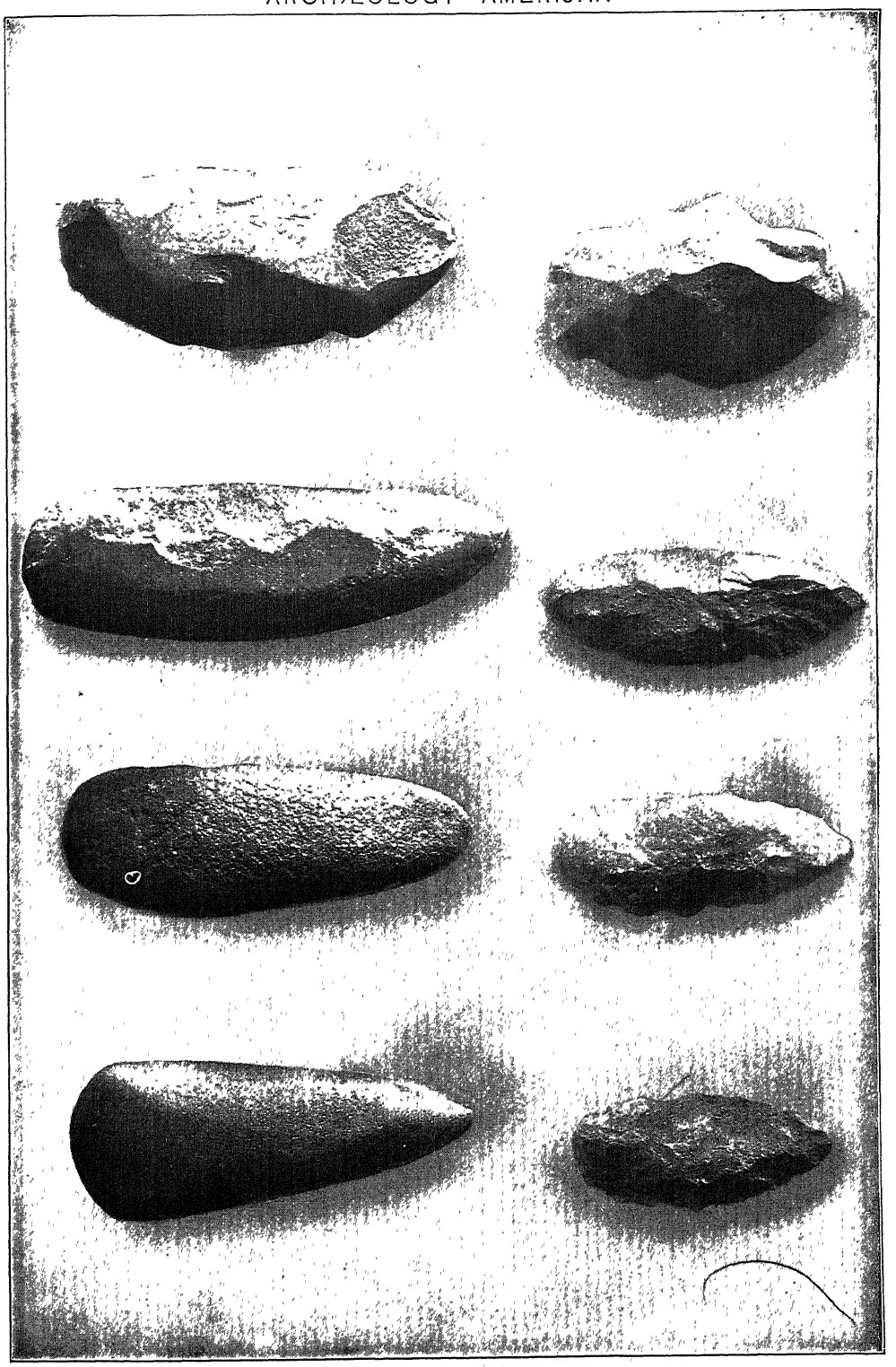
**Human Remains.** Bones of prehistoric men are exceedingly common in the mounds and other burial places of central and eastern United States; skeletons, with and without integument, have been found in caves throughout nearly the whole extent of both Americas, and are fairly common in the arid districts; and mummies of prehistoric bodies with complete wrappings have been found in large numbers, especially in Peru. The chief lesson taught by these remains is that the prehistoric inhabitants of the various regions correspond more or less closely, in most cases exactly, with the tribes found there by Caucasian explorers, the correspondence extending to the preparation of the body, the mode of burial, and the mortuary sacrifices, as well as to the somatic or physical characteristics of the individuals. In some cases diversities between the living and the dead have been found of such sort as to indicate migrations or displacements of tribes, and in a few instances these have thrown useful light on early movements of the aborigines; but in a general view these indications are of minor importance. By some students numbers of prehistoric crania have been grouped by types—e.g., dolichocephalic and brachycephalic—assumed to represent distinct genetic stocks or races, but since the types merge in very large series, since both are sometimes found in the same mound or cemetery and even in the same living clan, the value of the cranial classification would seem but secondary at the best. In some instances certain features of the prehistoric skeletons, especially the crania, throw light on customs. Thus, large numbers of crania taken from the burial places of Peru bear testimony to the fact that the critical operation of trephining was practiced more frequently even than in a modern military hospital, and with a degree of success hardly exceeded by that of the best modern surgery. Similarly the distribution of deformed crania throws light on cradle customs and on the half-intentional flattening of infantile heads in prehistoric times, while the pathologic conditions occasionally revealed by the buried bones serve to extend our knowledge of certain diseases and wounds and of the medical practice of the early tribes.

**Art Remains.** It should be kept in mind that the mere classification and description of the artifacts is but a preliminary step to their employment in the solution of the real problems of man and his activities. By comparing them with the works of living peoples and of historic tribes and nations, we determine the culture status of the people to whom they belonged at successive periods and develop from their study a clear understanding of the arts and industries involved in acquirement of materials, in manufacture, in distribution, and in utilization.

**Major Works.** *Inhabited Sites.*—The very general occupancy of the inhabited areas of the continent in early times is attested by the almost universal distribution of ancient village sites, kitchen middens, and ruins of substantial pueblos, some of which may well be ranked as cities. The simpler village sites and middens mark the dwelling places of the more primitive communities and contain the refuse of dwelling and food consumption and various minor relics telling of the arts and industries and manner of life of the people. These sites are most numerous along the shores of land-locked waters and the banks of rivers, where the hunter and the fisher found abundant supplies of aquatic game. The dwelling places of the more advanced peoples are marked by more substantial traces, the extent and character of the remains, industrial and architectural, signalizing them as the centres of culture and tribal dominion. They retain in many instances the remains of earth, wood, stone, and concrete construction illustrating every class of architectural achievement known to semi-civilized peoples, such as dwellings, civic and religious structures, tombs, fortifications, playhouses, agricultural works, quarries and mines, reservoirs, aqueducts, milling places, bridges, roads, and prisons. Between the simplest sites and the most advanced may be found examples illustrating every stage of the native civic development, all, however, presenting close analogies to the occupied sites of the tribes and nations existing on the arrival of Old World peoples; while widely diversified in character, all fall well within the culture range of the American race.

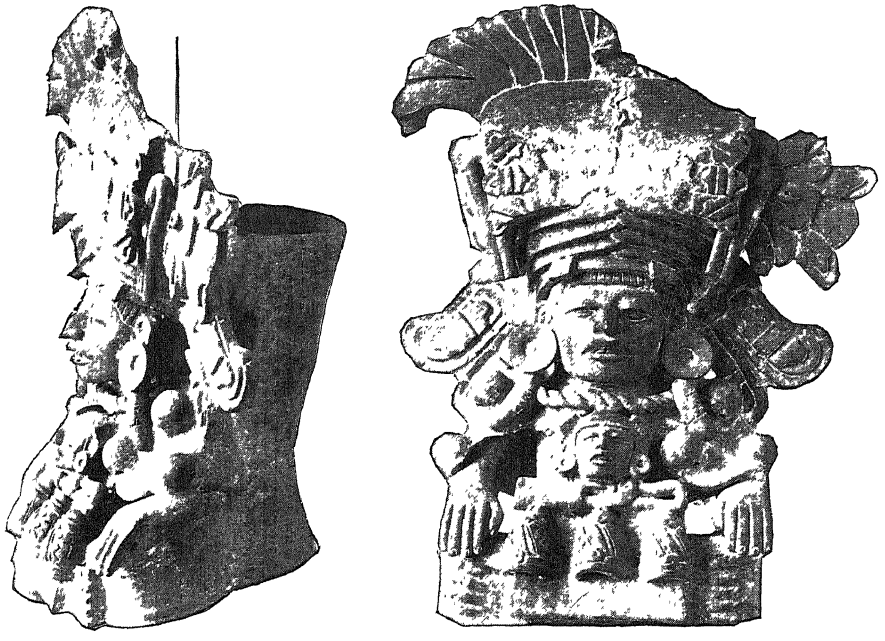
As a rule, the deposits of refuse called "middens" mark the sites of villages or of temporary periodical residence where at suitable seasons edible shell fish of numerous varieties were gathered and consumed. They contain many species of shells, but the more marked traces are those of the remains of oysters, clams, and the like. Middens are so numerous on some of the shores as to be practically continuous for many miles. The accumulations in places are so large as to be referred to as hills, the largest reaching perhaps 100 feet in height and covering tens or even hundreds of acres. Their mass is, in some cases, so great as to indicate long periods of occupation, and the inclosed artifacts are so distributed as to confirm this impression. The middens are especially prevalent along the Atlantic shores of North and South America and portions of the Pacific shores of the northwestern United States and Chile.

*Habitations.*—The dwellings of the aborigines comprised structures of diversified characteristics. Regarding the houses of the more primitive peoples, constructed of leaves, bark, brush, bones, mats, skins, earth, and snow, archæology



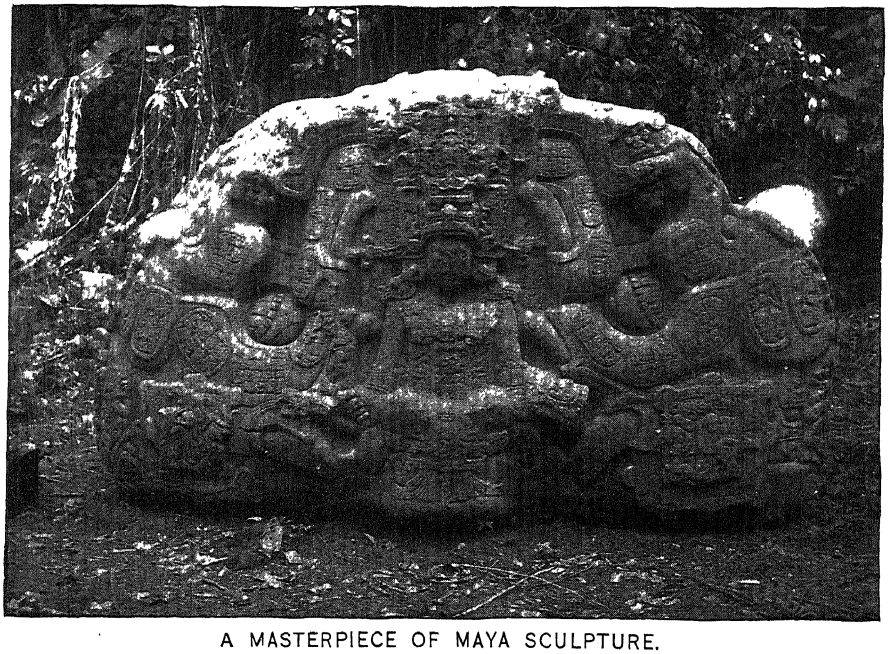
STAGES IN MANUFACTURE OF CELTS FROM RIVER PEBBLES. Ranging from partially chipped pebble to finished implement, from near Luray, Virginia.

STAGES IN MANUFACTURE OF CHIPPED IMPLEMENTS FROM QUARTZITE COBBLES. Ranging from "Turtle Back" or "Paleolith" to arrowpoint, from District of Columbia.



AN EXAMPLE OF ABORIGINAL MODELING IN CLAY.

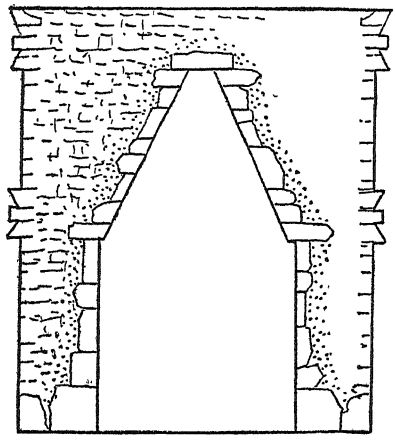
SIDE AND FRONT VIEWS OF AN ANCIENT EARTHENWARE VASE FROM OAXACA, MEXICO.



A MASTERPIECE OF MAYA SCULPTURE.

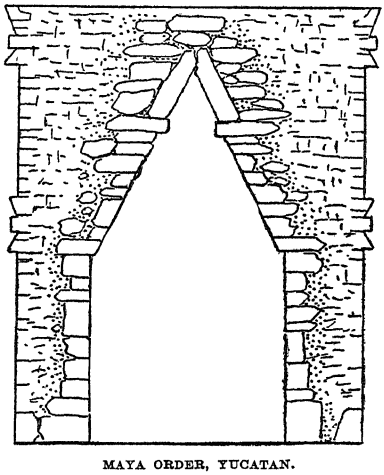
THE "TURTLE," PROBABLY AN ALTAR, QUIRIGUA, GUATEMALA.
DIAMETER 8 FEET.

can furnish but meagre data and must infer their nature from a study of the works of the post-Columbian tribes. Of the structures of durable materials such as stone, concrete, and adobe bricks, there are abundant traces in southwestern United States, in Mexico, and in Central and South America. It is not possible,



MAYA ORDER, YUCATAN.

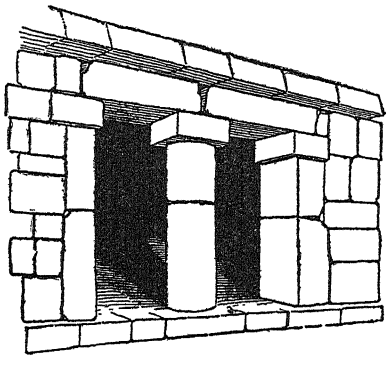
however, always to separate the domiciliary from the religious, defensive, and civic structures, and a difference of opinion has arisen especially with respect to the purpose of some of the greater buildings of middle America. Morgan considered these community dwellings, whereas others believe them to have been devoted to religious orders; in either case, however, they could be classed as dwellings. Of this type are the so-called monasteries and nunneries of the Maya province. That the communal dwelling was an institution of great importance in many parts of America is fully attested by ethnologists and historians. There can be little doubt



MAYA ORDER, YUCATAN.

that a large portion of the earthworks distributed along river valleys and more especially on the lowlands and flood plains of rivers were domiciliary, accommodating villages or the residences of dignitaries or rulers, while they served also as retreats for all the people in times of great flood or as citadels for defense on the near approach of warlike neighbors. Multitudes of minor mounds of earth and stone found in widely separated regions are merely the refuse of dwellings, as those left by the earth lodges of the Missouri valley, while perhaps a majority are mortuary.

*Defensive Works.*—Evidence is abundant that the ancient as well as the modern aborigines were often at war, and that the more cultured peoples gave much attention to military affairs, to the perfection of arms, and the construction of defensive works. Safety from the persistent encroachment of foes was often obtained or sought by the selection of strong defensive positions for permanent residence. The picturesque "Cliff Palace," Arizona, the impressive "Hill of Flowers," Mexico, and the wonderful citadel of Machu Picchu, Peru, are excellent examples. Defensive works, pure and simple, are of common occurrence, although it cannot be said that, judged by European standards, any particular military science is indicated. Passes in the hills, steep approaches to inhabited sites, and narrow necks of land connecting village sites



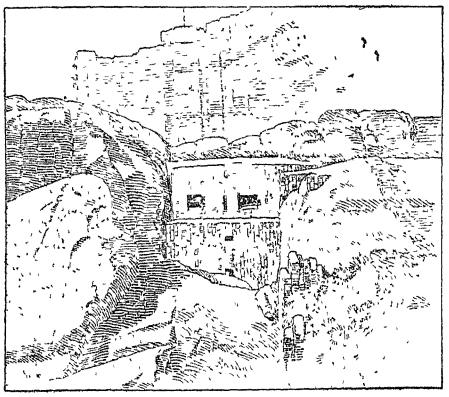
DOORWAY TO MAYA TEMPLES, YUCATAN — WIDE EXTERIOR DOORWAY DIVIDED BY A ROUND COLUMN SUPPORTING STONE LINTELS.

with adjacent highlands were defended by rude walls of stone, and villages were often surrounded by stockades, earthworks, and inclosures of stone built at great expense of time and labor. Examples of military structures are the remarkable earthern inclosures at Newark and at Fort Ancient, Ohio, and the strong masonry fortification at Mitla, Mexico, and of Sacsahuaman, Peru.

*Burial Places.*—American antiquities contribute most interesting evidence of the mortuary customs of the aborigines. The range of burial methods and of mortuary structures and monuments is so diversified, however, as to make brief presentation difficult. Caverns and rock shelters are natural burial places and were extensively used. Various devices, as the erection of cairns of stone and mounds of earth, were employed by the primitive tribes to secure the bodies of their dead against desecration by wild beasts. In the Mississippi valley mounds were sometimes erected over burial cists of timbers or over the charred bodies and the altars of clay on which precious belongings were sacrificed by burning. In the Middle West the bodies were encased in rude coffins built of slabs of stone, while in some regions graves were dug to great depths, as in Panama, Colombia, and Ecuador. The Mayas often deposited their dead in cists in the faces of their temple pyramids, and the Peruvians erected chulpas

or hewn stone provided with burial cells. Of all the classes of ancient remains, burial places yield the richest and most varied material for the study of the history of the race.

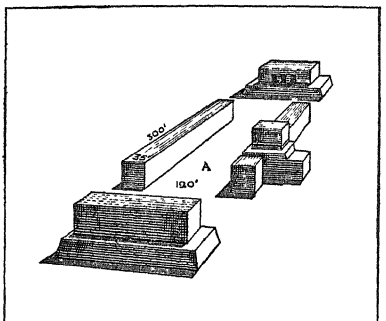
*Religious Works.*—Most ambitious of the aboriginal works of whatsoever branch are those devoted to the gods and to the rites and cere-



A CLIFF HOUSE, COLORADO.

monies of religion. From the lowest civilized nation the material representatives of the deities —the fetiches and idols—were provided with sacred receptacles or places of abode, and in the higher stages the genius of the native artificer was expended on the shrine, the temple, and the sculptured image. Among the more noteworthy examples of temple architecture are the pyramid temples of Mexico and Central America, while the colossal monolithic sculptures of Mexico, Copan, and Quirigua are marvels of elaboration. Rock-cut temples were not uncommon among the more advanced peoples. The face of the hill of Texcocingo, valley of Mexico, displays the battered remnants of colossal figures cut in the living rock, which originally were inclosed in sanctuaries or temples built against the hill. The ruin-crowned Hill of Xochicalco is pierced by a system of hallways and chambers, doubtless devoted to sacred purposes.

*Diversional Structures.*—The playgrounds of the primitive tribes were level spaces, natural




ROUGH SKETCH OF BALL OR TENNIS COURT.
The game was played in A, a space 120 feet by 600 feet.

or artificial. No examples of these have been identified, although the chunky game, played by the tribes of the southern States, is represented by many of the symmetrical and beautifully finished discoidal stones employed. The Maya peoples and perhaps others had ball courts of elaborate design, imposing dimensions, and architectural pretension. An example in Chichen Itza has two parallel walls of dressed stone, each 274 feet long, 26 feet high, and 30 feet thick, separated by a space 120 feet wide in which the game was played. Surmounting one wall are the remains of a handsome temple with giant serpent columns facing the court, while another remarkable building subjoins this on the east base, and two temples with columned porches face the court at the ends. Two stone rings fixed in opposite walls, 25 feet above the floor, afforded the test of skill. To win the game the ball had to be passed through these rings by a rebound from the hip of the player.

*Highways and Bridges.*—Without wheeled vehicles and draft animals other than dogs the aborigines had little need of broad highways. Mere trails served the purpose of the primitive tribes who had no more important vehicle than the dog travois, but the Peruvians employed in transportation immense herds of llamas and in times of trouble moved large armies for long distances. The Peruvian highways, traces of which still remain, were built by the Inca rulers to connect the northern with the southern provinces and the highland with the Pacific coast. They are the highest native achievement in this branch. The Sierra road was upward of 1000 leagues in length and traversed one of the most rugged mountain regions in the world. The lowland roads were paved in places with slabs of stone, while those crossing deserts were marked by stakes of wood. In middle America urban paved ways were common, as the "Road of the Dead" at San Juan Teotihuacan and the causeways of Tenochtitlan. Without a knowledge of the keystone arch the aborigines were unable to construct stone bridges of long span, but short spans were effected by means of the offset arch, as at Palenque, where an excellent example in cut stone is preserved. Long spans were accomplished by means of cables of vines or osiers fixed to the living rock or to heavy buttresses of masonry.

*Storage.*—The requirements of the storage of agricultural produce and other possessions led to the erection of special buildings for the purpose, as in Peru, but underground storage was utilized by most village peoples. The exploration of some of the ancient village sites in Ohio has brought to light a large number of storage pits, or caches. Provision for water conservation was essential in all arid and semi-arid regions. Shallow reservoirs are common in the arid region of the southwestern United States; in Yucatan, where little water is found on the surface, underground cisterns are numerous; and in Peru during the Inca period reservoirs and aqueducts of hewn stone, of extraordinary design and great extent were in use. Deep wells were dug in some regions, as at Manabi, Ecuador, and springs were walled up and terra-cotta pipes laid by various peoples.

*Mines and Quarries.*—Materials for the manufacture of implements and utensils, and for building were gathered from the surface or quarried from the rock in place. The quarrying of flint and other varieties of brittle stone for implements was a leading industry among the northern tribes. The evidences of this work, still extant, are of astonishing magnitude and indicate

a degree of enterprise and persistence not usually ascribed to the aborigines. The largest quarries, so far as examined, are those at Flint Ridge, Ohio; in the suburbs of Washington, D. C.; at Mill Creek, southern Illinois; in northeastern Oklahoma; in Wyoming; and in the State of Hidalgo, Mexico. The excavations cover many acres and in cases even square miles of the surface. Quarries of soapstone and of mica occur in great numbers in the Appalachian region, and hematite mines, where the ore for weapons and red and yellow oxides for paint were mined on a large scale, have been located near Leslie, Mo. Extensive mining of turquoise was carried on in New Mexico, Arizona, and Nevada, and the ancient Mexicans were probably supplied from these northern sources. The copper mines of the Lake Superior region, especially those of Isle Royal, from which this metal was distributed over half of North America, are of great magnitude. The bits or masses of native metal were removed by breaking up the containing rock matrix with sledges of stone, with the aid of fire. The quarries and mines were not carried far underground, most of them taking the form of deep open pittings, which are now largely filled up. The quarries from which stone for building was obtained in middle and South America as yet have not been thoroughly examined, but those at Mitla, Mexico, make it clear that the great blocks of stone were hewn out with rude stone hammers and picks, and at Ollantaitambo, Peru, blocks of porphyry weighing scores of tons were hewn out and transported over extremely difficult roads and were built into the great fortress, while others much larger were left by the way.

*Agricultural Remains.*—Most of the aboriginal tribes subsisted to a greater or less extent on the products of agriculture, the most remarkable prehistoric evidences of which are found in Peru, where, especially about Lake Titicaca, the mountain slopes are terraced elaborately to the height of hundreds or even thousands of feet. The Inca system of cultivation was wonderfully developed, and granaries were established for the preservation of stores of corn to be used in times of war or famine. Traces of the ancient agriculture are found in other regions, especially in southern Mexico. In Michigan there still remain ridged fields which, it is believed, were devoted to crop growing. In some regions the remains of reservoirs and irrigating canals are found, as in Arizona and Peru, indicating systematic cultivation of arid areas.

*Fixed Records.*—Traces of the graphic arts are among the most valuable contributions of the past to the history of culture. Rude attempts at the delineation of living subjects, especially men and animals, have been made by most primitive peoples; where painted on the walls of caves or engraved on rock surfaces these endure for long periods. Countless examples are found throughout America. Although their purpose cannot be fully determined, it is apparent that many of these delineations were designed as records or reminders and that through their employment progress was made in the development of the glyphic systems of the more cultured peoples and toward a system of record in which phonetic elements were gradually coming into use. The greatest advance in this direction was made by the Maya peoples of middle America, whose inscriptions in glyphic characters executed in a style of much maturity are found sculptured on the faces of colossal images, as at Quirigua and on large slabs of limestone, as at Palenque.

**Minor Artifacts.** On account of their durability, implements and utensils of stone, more than any other class of relics, are pregnant with the story of the past of humanity. Especially is this true of such of these artifacts as have become associated with geological formations, thus affording a means of determining questions of age, both absolute and relative. Objects of metals, bone, shell, and clay, also, are found in large numbers and extend the range of our information in numerous directions. First of all in the world of craft is the hammerstone—the king of implements—found in countless numbers on ancient sites. In the very early stages of culture fragments of stone and pebbles and bowlders were used to do many things with, and finally to shape many things with, and gradually themselves took shape by use, and artificial forms were worked out to increase effectiveness. Stone was quarried and metals were mined with them. Implements, utensils, and sculptures were shaped by them, and finally when nuggets of metal were found and swaged with their aid, the way was opened to civilization. Without the hammerstone no approach could ever have been made to the proud stage of culture known as enlightenment. Axes, hatchets, chisels, scrapers, abrading stones, projectile points, etc., were essential adjuncts of the arts of life among every people and are trustworthy indices of early primitive life and culture. Projectile points—the penetrating heads of arrows, spears, darts, and harpoons—are the most numerous and widely distributed of all artifacts and throw light on the story of the hunter, the fisher, and the warrior of all peoples. Among the articles of especial interest, recovered from caverns and from tombs in arid regions, as Arizona and Peru, are the complete weapons—the bows and arrows, the darts and dart-throwers of the people; and marvelous indeed as works of art are the carved and gilded dart-throwers, or atlatls, of ancient Mexico. Domestic utensils also had a wide range of form and use, and receptacles of stone, clay, wood, and wicker, and the varied milling appliances claim the especial attention of the archæologist. Spinning and weaving appliances and articles of costume in textile and tissue, preserved in abundance in arid regions, as well as personal ornaments of many materials, are of deepest interest to the historian of the race, as are objects of religious use—fetiches, charms, talismans, idols, and paraphernalia—including many things the precise employment of which is unknown.

As already mentioned, pictographs were engraved on rock surfaces by the primitive tribes, and glyphic inscriptions were carved on monuments by the more advanced nations. Similar ideographic designs were executed on bark and skins by the ruder tribes, while among the more cultured peoples paper made of the maguey plant came into use, and the long sheets filled with ideographic inscriptions in brilliant colors, complex design, and masterly execution were folded and bound in book form after the manner of the Orient. Most of these codexes were destroyed by the Spanish invaders or were otherwise lost, but fortunately a few excellent examples found their way into the libraries of Europe. Students are now engaged in the in-

terpretation of these writings as well as of the inscriptions sculptured in stone and wood and modeled in stucco, and have made much progress in determining their general significance and application, although thus far no key has been found by means of which they may be read. It is now known that these writings are not largely historic records in the ordinary sense of that term, but rather are calendaric in function, fixing the routine day by day, and the season of the elaborate religious practices of the priesthood, or connected with the affairs of state, recording dates, duties of officers and servitors, titles to land, concessions, tributes, etc. Many of the characters used retain recognizable traces of the pictorial originals, while some have become wholly conventional, resembling in a measure the alphabetic characters of the Chinese. It is clear that some of the characters at least stand for sounds, syllables, or words, rather than for ideas, and that a system of phonetic writing was in process of formation. This manifest approach to such a system marks the highest cultural achievement of the American race.

**Arts and Industries.** Having classified and described the diversified antiquities, the various activities involved in acquiring the materials used and in the shaping, distribution, and utilization of the things made should receive the attention of the archæologist. Among these activities the following are especially noteworthy: 1. *Food-acquiring arts*—hunting, fishing, agriculture. 2. *Food-preparing arts*—dressing, preparing, cooking, serving. 3. *Material-acquiring arts*—collecting, quarrying, mining. 4. *Building arts.* 5. *Sculptural arts*—fracturing, crumbling, scraping, carving. 6. *Plastic arts*—modeling. 7. *Metallurgic arts*—swaging, casting. 8. *Tissue-working arts*—hide dressing, tanning. 9. *Textile arts*—basketry, weaving, knitting, etc. 10. *Graphic arts and writing.* 11. *Arts of war*—use of weapons and offensive and defensive works. 12. *Transportation arts.* 13. *Clothing arts.* 14. *Embellishing arts.*

The character of each of these activities is recorded with varying fullness by the available materials of antiquity. In arid regions even the most fragile and perishable of art materials, as cotton, wool, and feathers, and the fabrics made of them, are preserved from pre-Columbian times almost without change, as in Peru, and serve to show what the peoples used, what they made, and how it was made. The story of the food-acquiring industries is told by weapons of the chase, especially those of stone, metal, and bone, and that of agriculture by the simple tools employed in cultivating the soil and by built and excavated storage places. The food-preparing arts are well represented by nut-cracking, mealing, and cooking utensils, and by the countless tools for cutting, rubbing, and pounding.

The varied activities connected with the acquirement of the materials employed in the arts, and with the preparation of these to serve the needs of man are of the greatest interest, but would require a volume for adequate presentation. Quarrying, mining, and transporting are included in this group, while the industries connected with the manufacture of implements and other articles of use and beauty are receiving of late years attention proportionate to their importance among the industries responsible for culture advancement.

The remains of the products of the building arts tell with great clearness the story of the varied activities in this connection of the ancient people and the sculptural, plastic, metal working, textile, and tissue-working arts are amply revealed in the multitude of implements which have been found. The activities connected with the graphic arts and writing, naturally varied and highly specialized, may be readily inferred from the nature of abundant remains.

The activities of war are practically unceasing among primitive tribes and employ the energies of the peoples in countless ways—in the preparation of weapons and the erection of defenses and in expeditions of offense—and are amply illustrated by the remains of antiquity. The remains of devices used in transportation tell of enterprises of vast importance, and the transported materials, as in earthworks and buildings, throw much light on the prowess of the people. The distribution of products of manufacture also makes it clear that trade often extended to distant lands.

The remains of the products of the personal arts—clothing and ornament—as well as of the embellishing arts generally reveal a wide range of activities varying in accordance with the materials used, the methods employed, and the æsthetic attainments of the people. It goes without saying that all the activities of the prehistoric peoples resembled closely the corresponding activities of the aborigines of post-Columbian times recorded by the ethnologist and historian.

**Problems of the Race.** Having assembled the material data of antiquity, as above outlined, and having acquired from the study of such data all that can be learned of the characteristics and activities of the race, the archæologist is prepared to apply his knowledge to the solution of the larger problems of race history—a work which he must share with the ethnologist and the historian and in which he must enlist the aid of students of many other branches of science—the geologist, the paleontologist, the physical anthropologist, the anatomist, the psychologist, and the geographer. The essential problems are those of:

1. *The origin and development of the race.*
   *a.* Characteristics and relationships.
   *b.* Migrations, distribution, population.
2. *The origin and development of culture.*
   *a.* Language and literature.
   *b.* Social organization and customs.
   *c.* Religion and religious customs.
   *d.* Arts and industries.
   *e.* Æsthetics.
3. *Chronology.*

The early stages of man's career are naturally unrecorded in traces of his handiwork, and the historian must rely on such skeletal remains as may be encountered. The Old World has supplied numerous well-verified examples of the physical remains of man extending back to the close of the Tertiary Age, but America has yielded no fully accepted data attesting great antiquity. For the present, therefore, it may be assumed that the race originated in the Old World and that America was peopled at a comparatively recent period by aberrant groups. As the land areas of the two continents are related in the present period, the course of migration would seem inevitably to have been by way of Bering Strait, and a study of the physical and

cultural characteristics of the aborigines tends strongly to support the view that they are in the main at least offshoots from northern Asiatic stems. It cannot be said with respect to problems of race origin that skeletal remains thus far discovered furnish data of great value, but the evidences of racial variation within America as exhibited in the several ethnic regions afford a promising field for research—a field as yet but imperfectly worked. Although general migratory movements resulting in the settlement of the continent may be safely inferred, the archæologist is without material evidence of such movements, and the more recent movements of the tribes and stocks which undoubtedly took place are not recorded with any considerable degree of fullness or certainty in the remains of antiquity, physical or cultural. The distribution of man over both Americas must have become general in the distant past, and in recent times the currents of migration have reached such a state of equilibrium that movements go on with equal facility in all directions. It is true that density of population has varied greatly with the regions and that certain large areas yield only meagre traces of protracted occupancy, but this latter condition may be due in part to the fact that the culture of these areas was so primitive as to leave slight traces to attract the attention of the explorer and collector. However, some idea of the density of population may be inferred from the character and abundance of the evidences left. That there were ever more people than at the period of discovery, generally estimated at from 10,000,000 to 20,000,000, does not seem probable.

Problems of the origin and growth of culture —of the intellectual development of the race— may be studied to excellent advantage in America. Investigations relating to the history of culture proceed on the theory that from the simplest possible beginnings in the manual arts gradual advance was made until the highest round of the ladder of culture was reached, and that a study of the entire series must reveal the steps, the processes, and the laws of advancement. The dynamic forces responsible for advancement are primarily the exacting requirements of physical existence, and secondarily the ever-present desire for betterment, increased comfort, and pleasure. The never-ceasing struggle for existence necessarily led to the development of energies and the awakening of ambitions, to steady advance in skill and ability, and to the improvement of the means and methods of winning from nature the necessities of life. The course of this struggle is amply illustrated in the vast range of the material phenomena of the arts—the subject matter of archæological research.

The archæologist does not have to concern himself with the multitude of American languages, except in so far as the methods of recording and writing are concerned, while the problems of social organization and customs are naturally left largely to the ethnologist. At all stages of primitive progress religion has been a chief factor in shaping and advancing culture, and the best products of the human hand and brain have been the offspring of the belief that the powers of nature, personified in a multitude of forms, could be influenced by offerings and appeals. It followed that the more elaborate, costly, and beautiful the offerings, the stronger the appeal, so that all material objects pertaining to worship—implements, utensils, fetiches, images, altars, sanctuaries, and temples—were elaborated and beautified to the limit of capacity and taste. Thus the æsthetic sense and æsthetic art were developed along with the development of religion and religious art. It may be said without fear of contradiction that no people at corresponding stages of culture advancement had a more elaborate system of religious beliefs and a wider range of personified deities than the Americans, and certainly none gave so large a share of their thought to æsthetic elaboration. Their decided genius for embellishment is manifest on every hand. It is further observed that the struggle for advantage through the increase of personal attractiveness and the attractiveness of personal belongings contributed unceasingly to the development of the arts of taste.

While the fundamental force making for progress was the ever-active struggle for enhancement of welfare and pleasure, the direction in which advancement was made and the rate of the movements depended largely on the diversified conditions imposed by environment. Where conditions were favorable, progress was rapid; where unfavorable, stagnation or retrogression followed.

Through the researches of archæology, assisted by the culture phenomena of the present, the remains of antiquity, more especially those of the later "age of stone," the problems of culture are finding solution, not complete in detail, but sufficiently full to satisfy the broader requirements of history.

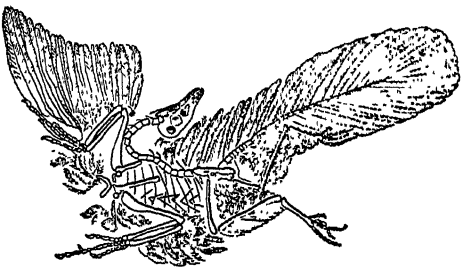
**Chronology.** The archæologist is in constant search for evidences of human antiquity in America, and hundreds of suggestive observations bearing on this subject are on record. None of the acceptable observations indicate an antiquity of man at all comparable to that indicated by observations in Europe and Asia. Briefly, there is a strong presumption that mankind existed in North America about, if not anterior to, the last ice invasion of the Pleistocene, 8000 to 30,000 years ago; yet positive evidence is far from complete, as indicated by the fact that not a single reported association of human remains and works of art with even the latest Pleistocene deposits is accepted without reserve by either anthropologists or geologists. In a few instances human bones have been found in such associations as to suggest the high geologic antiquity of man in America. The best known instance is that of the Calaveras skull alleged to have been found imbedded in auriferous gravels near Angels, Cal., interest in which was enhanced by frequent reports of the finding of stone implements in gravels of a corresponding age, and, in cases, beneath heavy sheets of lava. At the time the associations were reported the gravels were supposed be Pleistocene or Quaternary, and the lava till more recent, so that the accounts bore a air of credibility. Subsequently, it was ascertained that the auriferous gravels, and even the erlying lava beds, are of Tertiary Age, so tha he alleged associations would seem unworth of consideration unless supported by the stro est possible direct evidence. Recent researches ve shown (1) that the alleged finds of human relics in the gravel reported may be ascribed, as a rule, to accidental inclusion in comparatively recent times, the contents of superficial village sites having descended into the open mines, to

be discovered there by workmen entirely ignorant of the significance or possible provenance of the finds. These conditions, even if certain of the recovered objects are of great antiquity, since none are distinctive, make separation impossible and render the evidence nil; (2) that at least some of the artifacts alleged to have been found in the gravels were manufactured from the volcanic rock overlying the gravel beds; (3) that the Calaveras skull is of a type corresponding precisely with that of Indians still living in the same vicinity; (4) that its state of preservation corresponds closely with that of modern bones after a few years' burial in the limestone caverns or calcareous earths of the region; and (5) that the contemporary testimony concerning the finding of the cranium is contradictory, with the burden against the original allegation. Other reports of the occurrence of human remains in geologic deposits have come from Trenton, N. J., and other sites, notably at Lansing, Kans., and in Brazil and Argentina. With regard to the Trenton finds of crania, Hrdlicka has shown that most of them are of Algonquian type, while two are of north German type. The Lansing remains are assigned by some authorities to late glacial times, but geologists and anatomists fail to agree as to the period. The evidence obtained in Brazil and Argentina is embodied in a formidable array of literature, but recent critical examinations of the whole body of evidence leave it without any very substantial support. It is a most significant fact that caverns, the natural dwelling places of very primitive men, have yielded thus far in America no trace of man's early presence. On the whole, it may be said that while the human remains and antiquities of America throw much light on the chronologic problems of recent times, they afford but uncertain aid with respect to the beginnings and earlier stages of occupancy down to the close of the last glacial invasion of North America.

**Bibliography.** The literature of American archæology may best be consulted in the following general works in which extended citations are given: Bancroft, *The Native Races of the Pacific States*, vol. iv (New York, 1875); Nadaillac, *Prehistoric America* (New York, 1884); Winsor, *Narrative and Critical History of America* (Boston, 1884); Payne, *History of the New World called America* (2 vols., Oxford, 1892); Hrdlicka, "Early Man in South America," *Bul. 52, Bur. Am. Ethnol.* (1912); Joyce, *Archæology of South America* (1912); Hodge, "Handbook of the American Indians," *Bur. Am. Ethnol.* (1907). Current publications relating to American archæology are cited fully in the *American Anthropologist*.

**ARCHÆOPTERIS**, är'kē-ŏp'tē-rĭs (Gk. *ἀρχαῖος, archaios*, ancient + *πτερίς, pteris*, fern). A genus including some of the oldest known fossil ferns, originally described by Dawson in 1863 to include species from the Chemung group of the Upper Devonian. The leaves are bipinnate with obovate inequilateral pinnules; the fertile leaves having oval spore cases instead of pinnules. Perhaps the largest species is *Archæopteris jacksoni*, fine examples of which, attaining a length of 5 feet, are often found in the flagstone quarries of the upper horizons of the Catskill group in the central portions of the Catskill Mountains of New York. See FERN; CARBONIFEROUS SYSTEM; DEVONIAN SYSTEM.

**ARCHÆOPTERYX**, är'kē-ŏp'tē-rĭks (Gk. *ἀρχαῖος, archaios*, ancient, primitive + *πτέρυξ, pteryx, wing, bird*). The oldest known bird, found fossil in the Jurassic lithographic stone of Solenhofen, Bavaria, where it was discovered in 1861. It was a creature about the size of a crow, bird-like in form, having a rather short, blunt beak, the upper jaw of which was furnished with 13 teeth, and the lower with 3 teeth on each side, each planted in a separate socket. Its most extraordinary feature, however, is a lizard-like tail of 20 vertebræ, from each of which springs a pair of well-developed quill feathers. "The vertebræ of the neck and back were bi-concave, the sternum seems to have been keeled, and the manus had three free digits. The tibia and fibula do not coalesce, and the former was furnished with a series of feathers (wing-quills) very similar to those of the tail." These are divisible, as in modern birds, into primaries and secondaries. That it was able to fly is not doubted; the form of its feet, also, indicate arboreal habits, and that it scrambled about, as well as made short flights, is suggested by the fact that each finger of the hand, as well as the toes, was armed with a claw. The tail



ARCHÆOPTERYX MACRURA.
(Specimen from Solenhofen, studied by Owen.)

must have impeded rather than assisted flight, and it is interesting to note that in later birds this cumbersome member soon became modified into substantially the present form before the Cretaceous Era came to a close. (See BIRD.) It was first thoroughly studied by Owen (*Philosophical Transactions*, London, 1863); later information is summarized in Newton, *Dictionary of Birds*, article "Fossil Birds" (New York, 1893–96).

**ARCHA'IC** (Gk. *ἀρχαικός, archaikos*, old-fashioned, primitive, from *ἀρχή, archē*, beginning, origin). A term applied to the primitive stage of the art of a good period. Archaic art differs from the merely primitive in that it implies promise of future excellence. The term is especially applied to Greek art before c.450. *Archaistic* is applied to an imitation of this style; as when Greek artists under Augustus reproduced Greek sculpture of the sixth and early fifth centuries.

**ARCHAN'GEL** (Gk. *ἀρχι-*, prefix denoting dignity of rank + *ἄγγελος*, messenger, angel). A term occurring twice in the New Testament, 1 Thess. iv. 16 and Jude 9. The idea contained in the term is due to the Old Testament development of the conception of angels, which, in its earliest stage, was based upon an earlier animism and involved nothing more than the positing of supernatural beings, whose vocation, generally speaking, was to be in varied ways agents of God, with whom they were so closely associated as at times to be distinguished from him

rather by degree than by kind (cf. Gen. xviii. 33 with xix. 1). Gradually, however, the idea of moral distinctions among these angelic beings appeared, from which grew the conception of "evil angels" (Ps. lxxviii. 49; cf. 1 Chron. xxi. 1). Finally, under the Babylonian influence of the Exile and the Persian and Greek influences of post-exilic times, there appeared among these supernatural hosts the idea of ranks and even of names (Zech. ii. 3 f.; iii. 1, iv. 1, 11–14; Dan. iv. 13, viii. 16, x. 13, xii. 1). Both of these developed ideas—moral distinctions and ranks and names—are carried over into the New Testament writings, where use is frequently made of them. The first place in these ranks is evidently intended to be referred to in our term. See ANGEL.

**ARCHANGEL.** The capital city of the Russian government of Archangel, situated in lat. 64° 33′ N., and long. 40° 33′ E., on the right bank of the Dvina River, 26 miles above its entrance into the White Sea, and 740 miles northeast of St. Petersburg (Map: Russia, F 2). It is the largest and most important city in the world situated so near the Arctic Circle. The city is of ancient origin, and among its most noteworthy buildings is the handsome cathedral finished in the beginning of the nineteenth century. It is said to be the handsomest and best-lighted cathedral in Russia. The other buildings of interest are the bazaar or mart, the marine hospital, and the wooden "little house" of Peter the Great. The importance of the city is considerable, since it serves as an outlet for the products of the far northern and western part of Siberia. The chief articles of traffic are fish, skins, furs, timber, wax, iron, tallow, bristles, and caviar. At its annual fair, in September, about 14,000,000 rubles' worth of goods changes hands. The value of its exports and imports amounts to about 8,000,000 rubles ($4,500,000) annually, and it is visited by some 800 vessels from July to September, the only period of the year when the harbor of Archangel is entirely free from ice. Of the foreign vessels visiting the port the British and Norwegian are the most numerous. Considerable inland shipping is carried on by a large number of smaller vessels navigating the Dvina. The fact that the harbor is ice-bound during the greater part of the year has been the greatest obstacle to the commercial growth of the city. The site was visited in 1553 by the English expedition under Chancelor in search of a northeast passage to India. An English factory was erected soon after. The origin of the town dates from 1584, when a fort was erected. Pop., 1911 (est.), 35,414.

**ARCHAN'GEL,** or **ARKHANGELSK,** är-kän'gĕlsk. A government of Russia, between 61° and 71′ N. lat. and 28° to 66° E. long., extending along the White Sea and Arctic Ocean from Finland and Norway east to the Ural, and bounded on the south by the governments of Vologda and Olonetz. Its area, exclusive of large internal waters, is 326,063 square miles. It is the largest government of the Empire, and occupies the entire north of European Russia. Its greatest length, from west to east, is 990 miles; its greatest width, from north to south, is 132 miles. Four large navigable rivers flow through Archangel—the Petchora for 528 miles, the Onega 132 miles, the northern Dvina 265 miles, and the Mesen 265 miles, all emptying their waters into the White Sea. The northwestern and the northeastern parts are mountainous, reaching a height of more than 4900 feet. The climate of the central part of Archangel is very severe. In the extreme northeast it is perceptibly milder, and the open sea is never frozen. The great wealth of Archangel is in its forests, which cover more than half of its area. Lumbering is therefore the leading industry. Shipbuilding is also carried on. Some of the inhabitants are engaged in agriculture, which, at its best, is poorly developed; in fishing and hunting along the shores of the Arctic and the White Sea; and in the rearing of deer, which constitutes the almost exclusive occupation of the Samoyeds in the northern districts. Archangel is one of the most sparsely populated governments of Russia. The population was 331,200 in 1890, 426,200 in 1909, and was estimated to be 449,400 in 1911. Ninety-eight per cent of the people are Russians. Of the different tribes, as the Lopars, Zyrans, Samoyeds, etc., there are not more than 6000 persons. Consult A. P. Enlehardt, *A Russian Province of the North* (Westminster, 1889).

**ARCHANGEL,** NEW. See SITKA.

**ARCHANGELICA,** ärk'ăn-jĕl'ĭ-kȧ. See ANGELICA.

**ARCHAS,** är'kas. A character in Fletcher's *The Loyal Subject;* a much too "loyal subject" of the unworthy and thankless monarch in that play.

**ARCH'BALD.** A borough in Lackawanna Co., Pa., 10 miles northeast of Scranton, on the Delaware and Hudson, and the New York, Ontario, and Western railroads (Map: Pennsylvania, K 3). Its chief industry is coal mining, but there are some silk mills. The surrounding region is of interest from a geological standpoint on account of the enormous glacial potholes that have been uncovered here. Hills to the north of the town contain markings made in the Ice Age by the movement of glaciers into the valley below. There is very little timber. Pop., 1890, 4032; 1900, 5396; 1910, 7194.

**ARCHBALD,** ROBERT WODROW (1848—). An American lawyer and sometime judge of the United States Commerce Court, born in Carbondale, Pa. He graduated from Yale in 1871, studied law, and after admission to the bar began practice at Scranton, Pa. In 1885 he was appointed a law judge; in 1888, presiding judge of the 45th Judicial District of Pennsylvania; and in 1901, United States District Judge for the Middle District of Pennsylvania—a capacity in which he served for 10 years. Upon the creation of the United States Commerce Court in 1911 he was commissioned one of its judges by President Taft. Rumors of venality and unprofessional conduct on the part of Judge Archbald were investigated by the Judiciary Committee of the House in 1912. This investigation resulted in the formulation of 13 charges against him, each of which, in effect, charged him with attempting to use his office for financial gain, especially in efforts to purchase at a reduced figure property from coal companies which were then having or would have had litigation before his court. Articles of impeachment covering these charges having been preferred by the Judiciary Committee, and the House, in one deciding vote, having accepted the findings, the articles were at once forwarded to the Senate.

In December, 1912, the Senate, sitting as a Court of Impeachment, found Judge Archbald guilty as charged on five counts of the indictment, but acquitted him on eight. The outcome

automatically removed Judge Archbald from his seat on the Commerce Court bench and deprived him of the right of again holding office under the government. This was the ninth impeachment tried by the Senate within the history of the United States. Consult *Proceedings of the United States Senate and the House of Representatives in the Trial of Impeachment of R. W. Archbald* (1913). See COMMERCE COURT.

**ARCHBISHOP**, ärch'bish'ŭp (Gk. *ἀρχι-, archi-*, chief + *ἐπίσκοπος, episkopos*, overseer). The title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province and also exercises episcopal authority in his own diocese. The archbishop was probably originally the bishop of the chief town. The office appears as early as the fourth century. In the Oriental church the archbishops are still called "metropolitans," from the circumstance mentioned. In the African church, on the other hand, the term used was "primus." The great archbishoprics of the early Church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the sixth century the Archbishop of Rome has borne the name of Pope (*papa*). There is an official letter by Justinian, addressed to "John, Archbishop of Rome and Patriarch," and several ecclesiastical constitutions are addressed to "Epiphanius, Archbishop of Constantinople and Patriarch." The Synod of Antioch, in 341, assigned to the archbishop the superintendence over all the bishoprics and a precedence in rank over all the bishops of the Church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose, out of this superiority of rank, privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the patriarchs (q.v.) toward the end of the fourth and during the fifth century, and still more to the Pope in the ninth. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the Church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honor of having the cross carried before them in their own archiepiscopate, even in presence of the Pope himself, and of wearing the *pallium*.

In the Established Church of England there are two archbishops, both appointed by the sovereign, of whom the one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though, as ruling over a province in place of a single diocese, both have enjoyed the rank of metropolitans from the first, the Archbishop of Canterbury has all along enjoyed, not merely precedence as the successor of Augustine and the senior archbishop, but as possessing a preëminent and universal authority over the whole kingdom. This preëminence is marked in the titles which they respectively assume—the Archbishop of Canterbury being styled the Primate of All England (*metropolitanus et primus totius Angliæ*), while the Archbishop of York is simply called Primate of England (*primus et metropolitanus Angliæ*). It is also indicated by the places which they occupy in processions—the Archbishop of Canterbury, who has precedence of all the nobility, not only preceding the Archbishop of York, but the Lord Chancellor being interposed between them. Previous to the creation of an archbishopric in Ireland the authority of the Archbishop of Canterbury extended to that island. The amount of control which belongs to an archbishop over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese or is guilty of immorality, the archbishop may call him to account and even deprive him. In 1822 the Archbishop of Armagh, who is Primate of All Ireland, deposed the Bishop of Clogher on the latter ground. To the Archbishop of Canterbury belongs the honor of placing the crown on the sovereign's head at his coronation; and the Archbishop of York claims the like privilege in the case of the Queen-Consort, whose perpetual chaplain he is. The province of the Archbishop of York consists of the six northern counties, with Cheshire and Nottinghamshire. The rest of England and Wales form the province of the Archbishop of Canterbury. The dioceses of the two archbishops—that is to say, the districts in which they exercise ordinary episcopal functions—were remodeled by 6 and 7 Will. IV, c. 77. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called "peculiar"; with small districts in other dioceses, particularly London. The diocese of the Archbishop of York embraces the county of York, except that portion of it now included in the dioceses of Ripon and Manchester; the whole county of Nottingham, and some other detached districts. In Ireland there are two Protestant archbishops, elected by their fellow-bishops out of their number, and four Roman Catholic. Of the former, the Archbishop of Armagh is Primate of All Ireland; the Archbishop of Dublin being Primate of Ireland. They formerly sat alternately in the House of Lords; the three bishops who, along with them, represented the Church of Ireland, being chosen by rotation.

The Roman Catholic church in England and Wales has three archbishops; in Scotland two archbishops, while the Episcopal church in that country has no archbishop, but a *primus*. An English archbishop writes himself, "by divine providence"; a bishop being, "by divine permission"; and an archbishop has the title of "Grace," and "Most Reverend Father in God," while a bishop is styled "Lord," and "Right Reverend Father in God." The archbishop is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled within six months; and every bishop, whether created or translated, was formerly bound to make a legal conveyance to the archbishop of the next avoidance of one such dignity or benefice belonging to his see as the archbishop should choose.

The only archbishops in the United States are those of the Roman Catholic church, now 14 in number. Up to 1789 the ecclesiastical government of that church in this country continued under the vicar apostolic of the London district, the local superior at that time being Father John Carroll, of Baltimore. In 1789 Baltimore was erected into an episcopal see, and Father

Carroll became bishop. In 1808, after New Orleans, New York, and Boston had been erected into sees, Baltimore was raised to metropolitan rank, Father Carroll becoming the first archbishop, as he had been the first bishop, in this country. The dates of the establishments of other archiepiscopal sees in this country are as follows—the first date being that of the foundation of the see, and the second of its elevation to a metropolis: Oregon City, 1846. 1846: St. Louis, 1826, 1847; New Orleans, 1793, 1850; New York, 1808, 1850; Cincinnati, 1821, 1850; Dubuque, 1837, 1893; San Francisco, 1853, 1853; Milwaukee, 1844, 1875; Boston, 1808, 1875; Philadelphia, 1808, 1875; Santa Fe, 1850, 1875; Chicago, 1844, 1880; St. Paul, 1850, 1888.

**ARCHBOLD,** JOHN DUSTIN (1848–1916). An American capitalist, born in Leesburg, Ohio, and educated in the public schools. In 1864 he went to the Pennsylvania oil regions and spent 11 years in the oil industry. At the end of that period he became a director of the Standard Oil Company and served also as its vice president until the dissolution in 1911. He was then made director and president of the reorganized Standard Oil Company of New Jersey. Known to be an officer or director in numerous large corporations, he was for many years recognized as the practical head of the great oil interests of the country. In 1912 he came prominently into public notice by the publication of a series of letters which had been stolen from his files. These communications revealed more or less intimate business relations with several well-known public men and dealt especially with contributions made by the Standard Oil Company to the campaign funds of political parties. An investigation into campaign contributions was at that time being held by a committee of the Senate, and Mr. Archbold was called before it. He declared that he, representing the Standard Oil Company, had made a contribution of $125,000 to the Republican campaign fund of 1904, and that Theodore Roosevelt was aware that such a contribution had been made. He declared further that a demand for a second contribution of $150,000 was refused, and that the subsequent prosecution of the Standard Oil Company by President Roosevelt's administration was an indirect result of that refusal. Mr. Roosevelt testified before this committee that Mr. Archbold's assertions were unquestionably false as to his (Roosevelt's) knowledge of contributions by the Standard Oil Company, and he produced letters written by him to his campaign managers directing them to return such contributions if they were offered.

**ARCHCHANCELLOR.** The highest dignitary of the Holy Roman Empire. The title dates from the ninth century, when it was used by the Carolingians. From the tenth century the Archbishop of Mainz claimed the position in the German Empire. In the eleventh century the Archbishop of Cologne claimed the dignity and duties for Italian matters, and he was gradually admitted to be the Emperor's representative in Italy. In the twelfth century the Archbishop of Trier claimed a similar position in Burgundian affairs. The threefold division and the three Archchancellors were recognized in the Golden Bull (q.v.) of 1356. The Elector of Mainz retained the dignity until the end of the Holy Roman Empire in 1806. See Ducange, *Glossarium,* under the word *archicancellarius.*

**ARCHDALE,** ärch'dāl, JOHN (fl. 1664–1707). A Colonial Governor of North Carolina, born in England. He came to New England as the agent for Governor Gorges, of Maine, in 1664; was a commissioner for Gorges (1687–88); and was Governor of North Carolina, of which he was also a "proprietary." He reorganized the administration of the Colony, conciliated the Indians, and introduced the culture of rice. In 1698 he was elected a member of Parliament, but he declined to take the oath because of his Quaker principles. He published *A New Description of the Fertile and Pleasant Province of Carolina, with a Brief Account of its Discovery, Settling, and Government up to this Time* (London, 1707; and in B. R. Carroll, *History of the Colony of South Carolina,* 1836). Consult Alexander Hewatt, *Historical Account of the Rise and Progress of the Colonies of South Carolina and Georgia* (London, 1779).

**ARCHDEACON,** ärch'dē'kŭn (Gk. *ἀρχι-, archi-,* chief + *διάκονος, diakonos,* servant, minister of the church). An ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop. The archdeacon originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church and directing the deacons in their duties. From being thus mere assistants, archdeacons in the fifth century began to share the bishop's powers, and step by step attained to the authority they now enjoy, which from the ninth century became in many respects distinct from that of the bishop. Several synods protested against the innovation, but it was continued in the eleventh and twelfth centuries, when the archdeacons were recognized as the most influential of prelates. In the thirteenth century, their powers were limited by the establishment of episcopal courts. Their dignity and influence are now very much reduced in the Roman Catholic church, and many of their former functions are now exercised by vicar-generals.

In the Established Church of England, each diocese has from two to four archdeacons. No person can be appointed to this office who has not been six years a priest. His duties include visitation of the parishes, holding synods, ordering repairs of churches, and in other ways being, as the canon law calls him, 'the bishop's eye.' He is addressed as 'Venerable.' In the American Protestant Episcopal church the archdeacon exercises analogous functions, but the office is only found in some of the dioceses, and the number in the dioceses where it has been introduced varies from one to six. The office is found in all branches of the Church of England and also in the Lutheran church.

**ARCHDUKE,** ärch'dūk' (*arch* + *duke,* from Gk. *ἀρχι-, archi-,* chief + Lat. *dux,* leader). Archduke and archduchess are titles now taken by all the princes and princesses of the house of Austria. The title seems to have originated in the tenth century for Lorraine, when the latter was divided into two duchies of Upper and Lower Lorraine. It was once used for the ruler of Austria about the middle of the twelfth century. Rudolph IV of Austria, who died in 1365, called himself Palatinus Archidux. The title was formally conferred on the Hapsburgs by Frederick III in 1453. Various noble houses, especially that of Bavaria, disputed the title with the Hapsburgs, but since Rudolph II, Ger-

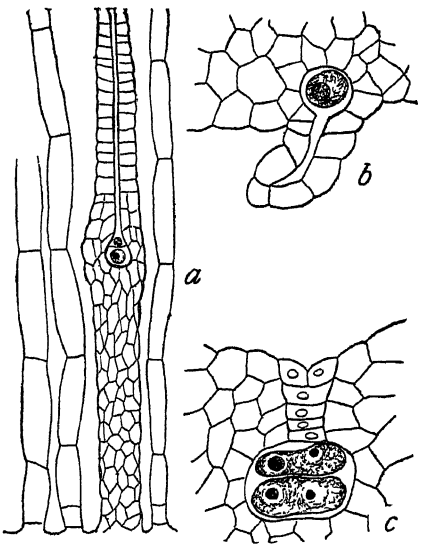
man Emperor from 1576 to 1612, their precedence has been established. Consult Selden, *Titles of Honor* (1672); and Ersch und Grüber, *Encyklopadie der Wissenschaften und Künste* (article, *Erzherzog*).

**ARCHEAN** (är-kē'an) **SYSTEM** (from Gk. *ἀρχαῖος, archaios*, ancient). A name proposed by J. D. Dana, in 1872, for the entire series of crystalline rocks that forms the oldest underlying fundamental complex of the earth's crust. Earlier names applied to this series were: Azoic, Primitive, Huronian, and Laurentian, of American geologists, and *Urgebirge* and *Primitivgebirge* of the still earlier Germans, Werner and Lehmann. The rocks of this system consist of a complex series of gneisses, granites, and schists, with a host of associated massive igneous intrusions, all of which have suffered profound disturbances and metamorphism to such an extent that it is extremely doubtful if at the present day there exist any traces of their original characters. They form, as a rule, the cores of the great mountain masses and are the original sources from which were derived, by erosion through countless ages, all the forms of later sedimentary rocks, which they underlie with marked unconformity. Various classifications of Archean rocks have been made in the attempt to organize them into stratigraphic groups, but owing to the complex nature of the series, and to the almost complete absence of reliable data for determining the relative age of the component formations, no one classification has as yet received general recognition. These Archean rocks of undoubted primeval origin, together with certain others, which because of their probable sedimentary derivation have been separated under the name Algonkian, antedate in respect of the time of their formation the rocks of the Cambrian system, and can be described to better advantage under the title PRE-CAMBRIAN FORMATIONS, to which article the reader is referred for further information. See also ALGONKIAN SYSTEM; TACONIC SYSTEM.

**ARCHEDEMUS,** är'kê-dē'mŭs (Gk. *Ἀρχέδημος, Archedēmos*), called GLAMON (the 'bleareyed'). A demagogue and popular speaker in Athens at the end of the fifth century and the beginning of the fourth century B.C. He is said to have been a foreigner who worked his way by fraud into the Athenian franchise, was poor, and was generally disliked by reason of his restless activity and meddlesomeness. By bringing an accusation against Erasinides, he took the first steps toward the impeachment of the Athenian generals who took part in the battle of Arginusæ (q.v.), 406 B.C.

**ARCHEGONIUM,** är'kê-gō'nĭ-ŭm (Gk. *ἀρχέγονος, archegonos*, first of a race, primal). The peculiar female organ of Bryophytes (mosses and liverworts), Pteridophytes (ferns, club mosses, etc.), and Gymnosperms (conifers, etc.), which together are often spoken of as Archegoniates. It is a flask-shaped organ, consisting of a *neck* more or less elongated and a *venter* more or less bulbous. A single egg occupies the venter, and in the process of fertilization the sperm enters by the open neck of the archegonium and comes in contact with the egg. Among the mosses the archegonium is a free and often-stalked organ. Among the liverworts the archegonia are variously disposed on the thallus body, while in mosses they are borne in a cluster at the apex of the leafy shoot or of its branches, the terminal rosette of more or less modified leaves forming what is often called a "moss flower." Among the ferns the archegonia are usually borne upon the under side of the inconspicuous sexual plant (prothallium), the venters being imbedded in the tissue and the necks more or less projecting. In the water ferns, quillworts, and little club mosses the female plant is developed as a tissue within the spore, whose heavy wall breaks or cracks at a certain place, and in the exposed part of the female plant the archegonia are developed. Among the conifers the spore, with its contained female plant, is retained within the ovule, and hence the archegonia are not exposed, but lie imbedded in the superficial part of the female plant (endosperm), toward the micropyle (the passageway left by the integument of the ovule). Among the conifers the male cells are brought to the archegonium by growing pollen tubes. The pollen grain, containing the male cells, rests at the base of the micropyle, upon the apex of the nucellus (central part of the ovule). The tube penetrates the tissue of the nucellus and reaches the embryo sac (megaspore), just within which are the archegonium necks. It then pierces the sac wall, enters and crushes the neck, and discharges its male cells into the egg.

Among the flowering plants no archegonia are developed, the embryo sac containing a free egg, along with other free cells of a much-reduced female plant.




ARCHEGONIA.
(*a*) of a moss, (*b*) of a fern, (*c*) of a liverwort, showing in each case the neck and the venter containing the egg.

The development of an archegonium and its preparation for fertilization are matters of great morphological interest. It begins as a single superficial cell of the sexual plant. By repeated cell divisions the layer of cells constituting the neck and venter is formed, and this surrounds a single row of axial cells. The cells of this row (variable in number) which lie within the neck are called the "neck canal cells," while the lowest cell of the row, the one within the venter, forms the egg. When the archegonium is nearly mature, the row of neck canal cells breaks down and leaves an open neck; and usually just before fertilization the cell in the

venter cuts off a small cell toward the neck called the "ventral canal cell," which rapidly disorganizes and leaves the egg free and alone in the venter, ready for the approach of the sperms through the neck.

One of the interesting facts in connection with archegonia is that the apical neck cells secrete a substance which attracts the sperms toward them. For example, this substance is not the same in mosses and ferns, so that even if archegonia of the two groups are close together the moss sperms and the fern sperms will be attracted only to their own archegonia.

**ARCHEGOSAURUS,** är'kē-gō-są'rŭs. See STEGOCEPHALIA.

**ARCHELAUS,** är'kē-lā'us (Gk. *Ἀρχέλαος, Archelaos*).—1. One of the Heraclidæ who, when driven by his brothers from his native land, fled to Macedonia and founded the town of Ægæ. He was the mythical founder of the royal house of Macedonia. See below, under 3.—2. A Greek philosopher and pupil of Anaxagoras. He was born at Athens, and was the son of Apollodorus or Myson. The outlines of his system were those of his teacher, but for the details of his cosmology he went back to the ideas of the earlier Ionic physicists. (See GREEK PHILOSOPHY.) He admitted a primitive matter, consisting of infinite particles similar in nature to the bodies formed from them. He also admitted a ruling Mind. Matter and mind he held to be mingled, and identified the primitive matter with air. Out of this air, thus endowed with mind, there arose, by processes of thickening and thinning, cold and heat, or water and fire—the former passive, the latter active. From the action of fire and water were formed the atmosphere and the mud out of which the heavenly bodies were developed. Living organized beings, at first of low type, sprang from the mud, and gradually the races of animals were formed. Man he held to be superior to other beings, by reason of his artistic and moral powers.—3. King of Macedonia, natural son of Perdiccas II. He came to the throne in 413 B.C., after murdering the rightful heir. Archelaus improved the internal condition of his kingdom, introduced changes for the better in the currency and in the army, and showed himself a warm patron of art and literature. Agathon, Euripides, Zeuxis, and other men of eminence visited his court, and only Socrates refused an invitation to go thither. Euripides wrote a drama, *Archelaos* (now lost), in his honor, introducing his mystical ancestor (see above, under 1). The palace of Archelaus was adorned with magnificent paintings by Zeuxis. Archelaus was either murdered or accidentally slain by his favorite, Cratæus or Crateuas, in 399 B.C.—4. A distinguished general of Mithridates. In the winter of 88–87 B.C. he was sent to Greece with a large fleet and army to oppose the Romans in that quarter. On the way he seized the Cyclades, together with Delos, and, by granting the latter island to Athens, won over that city to the side of Mithridates. On his appearance in Greece, the Achæans, the Laconians, and the Bœotians (except the people of Thespiæ), at once flocked to his standard. A three days' battle was fought in the neighborhood of Thespiæ, with indecisive result, but Archelaus was forced to fall back upon Athens and Piræus. In the summer of 87 B.C., Sulla landed in Greece and proceeded against Archelaus. After long and hard fighting Athens and Piræus were taken, in March, 86 B.C., and Archelaus retreated to Chalcis. Here he was joined by reinforcements from Mithridates, but he met with a crushing defeat at Chæronea. Of 120,000 men that Archelaus led into battle, barely 10,000 reassembled at Chalcis. In the meantime Mithridates sent into Greece a further force of 80,000 men under Dorylaus. With this force Archelaus faced the enemy at Orchomenus in 85 B.C. His army was almost entirely destroyed, but Archelaus himself, after hiding for several days in a swamp, finally escaped to Chalcis. Peace followed, but Archelaus, by his conduct in the negotiations, awakened the suspicions of Mithridates, and was, as a result, driven to side with the Romans in the second and third Mithridatic wars. (See FIMBRIA; MITHRIDATES; SULLA.)—5. Son of the preceding. He married Berenice, daughter of King Ptolemæus Auletes, in 56 B.C., and ruled over Egypt for the short space of six months during the banishment of Ptolemæus. He lost his life in a battle against Aulus Gabinius, proconsul of Syria.—6. Grandson of the preceding. He obtained from Marcus Antonius the province of Cappadocia, which he retained during the reign of Augustus. Tiberius accused him of political innovations and condemned him to death; but he was already old and broken, and he died at Rome soon after his trial, in 17 A.D.—7. A Greek sculptor, born at Priene, celebrated for his bas-relief representing the "Apotheosis of Homer," which was found in the seventeenth century on the Via Appia, near Bovillæ. The relief appears to be the votive offering of a poet made for a victory won at a poetic contest. Its time is placed all the way from 150 B.C. to the beginning of the first century A.D. The relief was purchased in 1819 for the British Museum.—8. Son of Herod, tyrant of Judæa. He succeeded his father in 4 B.C., and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, Archelaus went to Rome, where his authority was confirmed by Augustus, who made him Ethnarch of Judæa, Samaria, and Idumæa. After a reign of nine years he was deposed by Augustus, on account of his cruel tyranny, and banished to Vienna in Gaul, where he died. His territories were added to the Roman province of Syria.

**ARCHENHOLZ,** är'kĕn-hōlts, JOHANN WILHELM, BARON VON (1743–1812). A German historian. After service in the army, he gained his discharge at the close of the Seven Years' War and passed several years in travel, visiting almost all the principal cities of Europe and supporting himself by authorship. He wrote *Geschichte des siebenjährigen Krieges* (1789; 13th ed., 1892), which, when compared with the generally dry style of his German contemporaries, deserves praise on account of its narrative interest. He also wrote *Annalem der brituschen Geschichte* (20 vols., 1789–98), and biographies of Queen Elizabeth of England and Gustavus Vasa of Sweden.

**AR'CHEOZO'IC E'RA.** The period of geological time compassed by the formation of the rocks of the Archean system (q.v.). It is therefore the earliest of the major time divisions. No fossils or other direct evidences of life have come down to us from the Archeozoic, but the existence of some form of life at that time is inferred from the presence of carbonaceous materials and the probable occurrence of carbonates. Owing to their absence and to the very

great difficulties encountered in establishing any orderly arrangement of the rocks, no estimate of the duration of the era is possible, although it must have been very great.

**ARCH'ER,** BELLE (1860–1900). An American actress, named Arabella S. Mingle, but known as Miss Archer after her marriage in 1880 to Herbert Archer, from whom she was divorced in 1889. She was born at Easton, Pa., and made her début at Washington, D. C., with William Florence in *The Mighty Dollar*. Afterward she appeared in *Pinafore, Hazel Kirke*, etc., and for some time played with E. H. Sothern, as Rose in *Lord Chumley* (1888) and in other pieces. She also supported Alexander Salvini, and in Daly's company took the part of Maid Marian in the later productions of Tennyson's *Foresters*. In 1894, after having left the stage for a time, she resumed her career as a star, and afterward was for a while leading woman with Sol Smith Russell.

**ARCHER,** BRANCH T. (1790–1856). A Texas patriot. He was born in Virginia, where in early life he practiced medicine. In 1831 he went to Texas, took part in the Revolution, and in 1835 presided over the "consultation" called by the American settlers to consider the subject of independence. During the same year he was one of the three commissioners sent to Washington to solicit aid from the United States. In 1836 he was Speaker of the Texas House of Representatives, and from 1839 to 1842 was Secretary of War for the new Republic.

**ARCHER,** FREDERIC (1838–1901). An American organist, born at Oxford, England. He studied music in London and Leipzig, and held musical positions in England and Scotland until 1880, when he was appointed organist of Plymouth Church, Brooklyn, N. Y. Afterward he became conductor of the Boston (Mass.) Oratorio Society, director of Carnegie Music Hall, Pittsburgh, Pa., and in 1899 organist of the Church of the Ascension, Pittsburgh. He founded, in 1885, the *Keynote*, which for a time he edited. In 1896 he established the Pittsburgh Symphony Orchestra. He published, besides numerous compositions for the organ, *The Organ* and *The College Organist*.

**ARCHER,** JOHN (1741–1810). An American physician. He was born in Maryland, and graduated at Princeton in 1760, the first man in the United States to receive the degree of doctor of medicine, when he graduated at the Philadelphia Medical College in 1768. He was an officer in the army of the Revolution, a member of the Maryland General Assembly, and a representative in Congress from that State for three terms, 1801–07.

**ARCHER,** WILLIAM (1856–1924). An English dramatic critic, born at Perth, Scotland. He received the degree of M.A. at Edinburgh University in 1876, and was on the staff of the Edinburgh *Evening News* from 1875 to 1878. He was a dramatic critic of the London *Figaro* from 1879 to 1881; was called to the bar at the Middle Temple in 1883, and succeeded Dutton Cook as dramatic critic of the London *World* in 1884, where he remained till 1905. Subsequently he was dramatic critic for the London *Tribune* and for *The Nation*. Reinforced by Bernard Shaw and a few others, Archer introduced Ibsen to the English stage, and indeed to the English-speaking world; his efforts gained for *The Pillars of Society* its first London production in 1880, and it was his translation of *A Doll's House* that was presented nine years later. In 1890–91 he edited and in part translated the prose dramas of Ibsen, and published them in five volumes; this edition was followed by his *Collected Works of Ibsen* in 11 volumes. Archer has been a tonic influence upon the whole course of English and American contemporary drama. Among his works pertaining to the English drama are: *English Dramatists of To-day* (1882); *Henry Irving*, a study (1883); *About the Theatre* (1886); *Study in the Psychology of Acting* (1886); *W. C. Macready*, a biography (1890). He translated from the Norwegian Kielland's beautiful *Tales of Two Countries* (1891), and from the Danish a large part of Georg Brandes's *William Shakespeare* (1898). He visited the United States in 1899 to study the stage here, and after his return published *America To-day* (1900). Later books include: *Poets of the Younger Generation* (1901); *Real Conversations* (1904); *A National Theatre: Scheme and Estimates* (with H. Granville Barker, 1907); *Through Afro-America* (1910); *The Life, Trial, and Death of Francisco Ferrer* (1911); *Play-Making* (1912).

**ARCH'ER-FISH.** Any of the small spiny-rayed East Indian fishes of the family Toxotidæ. They are said to eject from their mouths drops of water aimed at insects. These, when the aim is good, fall to the water and are seized as prey by the fish. Specifically, the name is applied to *Toxotes jaculatrix*, which, because of this interesting habit, is often kept in house aquaria in the East.

**ARCH'ERY** (OF. *archerie*, from LL. *arcarius*, bowman, from Lat. *arcus*, bow). The use of the bow and arrow is still practiced by enthusiasts as a means for the capture and destruction of game; but its main use to-day, except in a few remote nations, is as a recreation and healthful exercise. The use of the bow and arrow is coeval with man's authentic history; thus Ishmael "dwelt in the wilderness of Paran and became an archer" (Gen. xxi. 20). The archery of Jonathan is specifically referred to in Holy Writ, and Josephus, the Jewish historian, alleges that the bow was considered the most efficient weapon of the Jews. It was deadly in the hands of their conquerors, the Babylonians, who have left many sculptured memorials of their prowess with it. It is not surprising, therefore, to find that their near neighbors, the Persians, cultivated its practice, or that the Scythians carried the lesson of its value to the Greeks, from whom it passed, with the empire of the world, to the Romans. These, in their turn, were vanquished by the superior skill of the archers of the Goths, Huns, and Vandals.

Both as a weapon of the chase and for military purposes, the bow was for centuries most formidable in the hands of the English. With the longbow they decided the fate of nations, as at Crécy (1346) and Poitiers (1356) and Agincourt (1415). The skill of their hunters and the wonderful feats of their archers have come down to us from many sources. Especially are the ballads rich in incidents of their prowess. One old black-letter ballad, reprinted in Percy's *Reliques*, tells of "Three Archers," one of whom, shooting before the King, split a wand in two at a distance of 400 yards; and then, not satisfied with this example, tied his eldest son, a lad of seven years of age, to a stake 120 yards off, and cleft an apple placed on his head.

In a treatise on martial discipline, by Ralph Smithe, written in the time of Elizabeth, we have a picture of the English archer: "Captens and officers should be skillful of that most noble weapon the long-bow; and to see that their soldiers, according to their draught and strength, have good bowes, well nocked, well strynged, everie strynge-whippe in their nocke, and in the middes rubbed with wax braser, and shutting-glove, some spare strynges trymed as aforesaid; every man one shefe of arrows, with a case of leather defensible against the rayne, and in the same four-and-twenty arrowes, whereof eight of them should be lighter than the residue, to gall or astoyne the enemye with the hailshot of light arrowes before they shall come within the danger of their harquebus shot. Let every man have a brigandine or a little coat of plate, a skull or hufkyn, a maule of leade of five foote in lengthe, and a pike, and the same hanging by his girdle with a hook and a dagger."

In Queen Elizabeth's reign the practice of archery ceased to be a national necessity; yet she was able to offer Charles IX of France 6000 men, one-half of whom should be archers; and shortly before the beginning of her reign the celebrated scholar, Roger Ascham, who was a lover of all kinds of sport, wrote the classic work on archery, *Toxophilus, or the Schole of Shooting*, in 1545, in which he gave minute directions on attitude and the manner of drawing the bow. It is a very practical book: indeed, one point he makes is worth transcribing even to-day. Young archers, he says, generally fall into the fault of fixing the eye on the end of the arrow rather than on the mark. To obviate this evil he advises them to shoot in the dark by night at lights set up at their proper distances—a very shrewd bit of advice.

England had not a monopoly of skill in archery; even in the Middle Ages the Egyptians, Arabs, and Turks ran them close. Baumgarten, indeed, relates that he saw 60,000 Mamelukes assembled in a spacious plain, who exhibited almost incredible agility in shooting on horseback, shooting arrows while in full career, and mounting and remounting on either side of their horses and shooting time and again, yet seldom or never missing their mark. He even asserts that horsemen shot while guiding two horses, one under either foot, as men ride in a circus, and their arrows found their mark.

So universal, indeed, was the skill in archery before the advent of gunpowder that no country has been discovered in which it was not the chief reliance of the natives in the chase and war. Vasco da Gama found it in the East Indies and Columbus in the West. The Amazons of South America opposed the invading Spaniards with it. It was found by Cabral in Brazil, and in the uttermost solitudes of the Arctic regions it was in use among the Eskimos. Even to-day the pigmy Bosjemen, in the far interior of Africa, bring the mightiest of game to earth with their poison-tipped arrows: a very ancient and widespread practice to which Justin bears witness in the time of Alexander, and Pliny among the Gauls, as well as Vergil and numerous other classical chroniclers.

But the introduction of gunpowder gradually put an end to the use of the bow and arrow, notwithstanding valiant efforts to maintain the ancient traditions. The Rolls of Parliament are full of indications of the gradual falling off of the voluntary practice of archery at the town butts. It was almost unheard of until it came into new life in London in the year 1760 as an exercise conducive to the improvement of health, and as such it met with a very favorable reception—so much so that by 1781 the Royal Toxophilite Society was formed. The almost continuous wars in which Great Britain for the next 30 years was involved put a limit to it; but after the peace of 1813 archery gradually assumed a stronger position, attested even to this day by numerous societies, popular gatherings, and contests. Modern practice in archery is mainly confined to shooting at targets, although a few sportsmen use it for still hunting. The modern targets are set at various ranges, and the concentric rings of gold (in the centre), red, blue, and black and white have a value in counting of 9, 7, 5, 3, and 1, respectively. In America there are annual competitions of the National Archery Association, and other annual contests by the Potomac Archery Association and the Eastern Archery Association. In these there are contests in "Double national rounds" of 96 arrows at 60 yards and 48 arrows at 50 yards; "Double Columbia rounds" of 48 arrows at 50 yards, 48 arrows at 40 yards, and 48 arrows at 30 yards; "Double York rounds" of 144 arrows at 100 yards, 96 arrows at 80 yards, and 48 arrows at 60 yards; "Double American rounds" of 60 arrows at 60 yards, 60 arrows at 50 yards, and 60 arrows at 40 yards; "Potomac rounds" of 24 arrows at 80 yards, 24 arrows at 70 yards, and 24 arrows at 60 yards; as well as competitions for the longest flight and team competitions of 96 arrows at 60 yards for men and 96 arrows at 50 yards for women.

The crossbow, or arbalest, was shorter than the longbow. It was mounted on a stock, and discharged by means of a catch or trigger. This form of archery was chiefly used by the English at the sieges of fortified places and in naval battles. Ultimately its use was, in the reign of Henry VII (1485–1509), forbidden by law, but continued intermittently for a long time.

Partly as the result of the growing popularity of tennis, archery began to lose ground in this country in the early '80s of the last century, but about the year 1905 there appeared definite symptoms of a revival of interest in it, and during the next few years this interest steadily increased, so that by 1913 flourishing archery clubs had been formed in many of the larger cities throughout the United States. The annual meeting of the National Archery Association at Boston, Mass., in July, 1913, brought together one of the largest assemblages of archers ever seen in this country.

Consult: Roger Ascham, *Toxophilus, or the Schole of Shooting* (London, 1868); G. A. Hansard, *The Book of Archery* (London, 1840); E. S. Morse, *Archery, Ancient and Modern* (Worcester, Mass., 1792); Maurice Thompson, *The Witchery of Archery* (New York, 1878)—a charming book, and the standard American treatise on the subject; T. Roberts, *The English Bowman* (London, 1801); T. Waring, *A Treatise on Archery* (London, 1828).

**ARCH'ES, COURT OF.** The court of appeal of the Archbishop of Canterbury, as metropolitan of the province. The name is derived from the ancient place of sitting, which was in the Church of St. Mary of the Arches, now usually called Bow Church, in London. The judge of the Court of Arches is styled the Official Principal, although he has for several centuries received

the additional title of Dean of the Arches. Appeals from judgments of this court are heard before the judicial committee of the Privy Council (q.v.). The Court of Arches is empowered to hear such suits as are sent up to it by letter of request from the consistorial courts of the bishops of the province of Canterbury after they have issued commissions of inquiry and the commissioners have made their report. The Court of Arches is the only ecclesiastical tribunal which has authority to pass sentence of deprivation against a clerk in holy orders. Since 1875 the judge of the provincial courts of Canterbury and York has performed the functions of official principal of the Court of Arches, under the Public Worship Regulation Act of 1874.

**ARCHETYPE,** är'kē-tīp (Gk. *ἀρχέτυπος, archetypos;* Lat. *archetypum,* a stamp, die, or model). The original design or pattern after which anything is made or modeled. In numismatics an archetype is the standard coin to whose weight, shape, and design all others of the issue must conform. In palæography the name is applied to an original manuscript from which a number of others are copied, these being then described as constituting a single "family." (See TEXTUAL CRITICISM.) In biology the archetype is an assumed system or structure on which any group of living organisms, whether animal or vegetable, is said to have been made.

**ARCHEVITES,** är'kē-vīts. A people mentioned in Ezra iv. 9. The term probably refers to the inhabitants of Erech in Babylonia (see URUK), who were deported to Samaria by "the great and noble Asnappar"—i.e., Ashurbanipal (668–626 B.C.)—possibly because they had united with Babylon in the revolt of Shamash-shumukin.

**ARCHIAC,** är'shē'äk', ETIENNE JULES ADOLPHE DESNIER DE SAINT SIMON, VICOMTE D' (1802–68). French geologist and paleontologist, born at Rheims. He began the study of geology in 1830, paying particular attention to the geologic formations of France, Belgium, and England. His most important work is *Histoire des progrès de la géologie, 1834–1839* (8 vols., 1847–60).

**ARCHIANNELIDA,** är'kī-ăn-nĕl'ī-dà (Gk. *ἀρχι-, archi-,* chief, first, primitive + Neo-Lat. *Annelida,* from Lat. *annellus, anellus,* little ring). A group of small primitive marine worms, regarded by Parker and Haswell as a class, embracing only the families Polygordiidæ and Histriodrilidæ, the latter minute egg-devouring parasites of the lobster.

**ARCHIAS,** är'kī-as (Gk. *Ἀρχίας, Archias*), AULUS LICINIUS. A Greek poet, known only through the famous oration *Pro Archia Poeta,* which Cicero delivered in his behalf in 62 B.C. He was born in Antioch, about 119 B.C., but early settled in Rome, where he gained the patronage of the prominent men of the day, as Marius and Lucullus, by writing poems on their warlike deeds. He had obtained citizenship in Heraclea, a city that had a formal treaty with Rome, and, on the basis of this fact, desired Roman citizenship, in accordance with a law passed in 89 B.C., which had given Roman citizenship to all individuals who could prove that at the time of the passage of the law their names had been included in the list of citizens of a city in Italy that had treaty relations with Rome. However, his status as a citizen of Rome was challenged, and his case was pleaded by Cicero. The decision of the judges is not known.

**ARCHIATER,** är'kī-ā'tĕr (Gk. *ἀρχίατρος, archiatros,* chief physician, whence Ger. *Arzt,* physician). A title given by the successors of Alexander to their chief physicians; and, later, by some Roman rulers to their favorite medical attendants, who were usually Greeks. It was bestowed also on state physicians. In the latter sense the use of the title spread to all large towns, since in these a certain number of doctors were selected as *archiatri,* with salaries and perquisites from the public treasury; they were required to minister to the poor without charge. They also served in the same capacity as modern health officers. Consult Watson, *The Medical Profession in Ancient Times* (New York, 1856), and Goldhorn, *De Archiatris Romanis* (Leipzig, 1841).

**ARCHIBALD,** är'chī-bâld, SIR ADAMS GEORGE (1814–92). A Canadian statesman. He was a native of Nova Scotia, and was chosen to the Colonial Legislature in 1809 and in 1888. In 1856 he was Solicitor-General, and one of the Liberal leaders. He was active in bringing about the confederation of the British Provinces, and in 1867 was President of the Council in the cabinet formed by Sir John Young, and Secretary of State for the Provinces. During 1870–72 he was Lieutenant-Governor of Manitoba, and afterward served two terms as Lieutenant-Governor of Nova Scotia, and for a short period as Judge of Equity. He was knighted in 1885. In 1886 he was returned to the Dominion House of Commons.

**ARCHIBALD,** JAMES FRANCIS JEWEL 1871—). An American war correspondent and writer. He was born in New York City and graduated from Ohio Wesleyan University. Having served as war correspondent in the Chino-Japanese War, and with General Miles in several Indian campaigns, he volunteered as an aid-de-camp in the Fifth Army Corps during the Spanish-American War. He was a member of the first scouting expedition that landed in Cuba about a month before the outbreak of hostilities and was the first American wounded in the war. Afterward he saw much varied service as correspondent in all parts of the world: in the Sudan, South Africa, Venezuela, the Philippines, Russia, Morocco, Albania, and Portugal. He became a fellow of the Royal Geographical Society and of the Royal Society of Arts of London. His published writings include *Blue Shirt and Khaki* (1901), *Tales from the Trenches,* and several plays.

**ARCHIDAMUS,** är'kī-dā'mŭs (Gk. *Ἀρχίδαμος, Archidamos*) II (?–427 B.C.). A son of Zeuxidamus, and King of Sparta. He became King after the banishment of his grandfather, Leotychides, 469. In the fourth year of his reign Greece was shaken by a terrible earthquake, and Sparta was left a heap of ruins. Archidamus was at that time foremost in crushing the uprising of the Helots. Before the Peloponnesian War he spoke in favor of arriving at a peaceable settlement of the matters under dispute. In 431 he led an army into Attica, and in the three following years conducted campaigns. He was the father of the famous Agesilaus.

ARCHIDAMUS III (?–338 B.C.), son of Agesilaus and King of Sparta. He succeeded his father in 358. In 367 he defeated the Arcadians in the so-called "Tearless Battle." In 362, shortly before the battle of Mantinea, he successfully defended Sparta against Epaminondas.

At the beginning of the Sacred War he attacked the Phocians. In 338 he led an army to Italy to aid the Tarentines, and was killed in battle on the same day on which Philip won the battle of Chæronea.

ARCHIDAMUS IV, a grandson of Archidamus III, and King of Sparta. It is not known when he came to the throne or how long he ruled. He was King in 294 B.C., for he was defeated in battle in that year by Demetrius Poliorcetes.

ARCHIDAMUS V, a grandson of Archidamus IV, brother of Agis IV, and King of Sparta. On the occasion of his brother's murder (240 B.C.) he fled, but subsequently returned with the object of reëstablishing his power. He was, however, almost immediately slain by his brother's murderers, who feared his vengeance. Archidamus V was the last king of the Eurypontid line.

**ARCHIDAMUS.** A Bohemian lord in Shakespeare's *A Winter's Tale*, appearing only in Act i, Scene 1.

**ARCHIL,** är'kĭl (of uncertain origin), or **ORCHIL,** ôr'kĭl (*Orseille*). A coloring substance obtained from various species of lichens. The archil is not originally present in the lichens, but is developed by the following treatment: The lichens, collected from rocks near the sea, are ground into a pulp with water and diluted ammonia is added; certain colorless acids (erythric acid, etc.) contained in the lichens gradually change, under this treatment, into a purple substance, *orcein*, which is the coloring principle of archil. (If in the same process the carbonate of sodium or of potassium is added to the pulp, ordinary litmus is produced in place of *orcein*.) Archil imparts a beautiful and durable violet color to marble. It has also been used in coloring wines, and was formerly used in wool dyeing, yielding red and violet shades. It is brought into the market in three different forms. The name *archil* is commonly applied to the ordinary pasty form. When offered in the form of a dry mass, it is called *persis*, while powdered archil is known as *cudbear*. The lichens used in the manufacture of archil grow on the rocky coasts of South America, Madagascar, Zanzibar, the Canary Isles, and a number of other places. They belong principally to the genus *Roccella*. They are sometimes called orchella weed, or dyer's moss.

**ARCHILOCHUS,** är-kĭl'ō-kŭs (Gk. Ἀρχίλοχος, *Archilochos*). A native of the island of Paros, who flourished in the seventh century B.C., and is regarded as the first of the Greek lyric poets, although the origin of the elegy is ascribed to Callinus, a writer who flourished a short time before Archilochus. Glimpses of his life, especially of the calamities which befell him, were frequently given in his writings, which are strongly personal throughout. His father's name was Telesicles; his mother was a slave called Enipo. At an early age, becoming entangled in political contests, he abandoned his native town and led a colony of its citizens to Thasos, in 650 or 640 B.C. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians, yet not through cowardice. Subsequently he was banished from Sparta, to which he had gone, some say because the Spartans resented the frivolous verses in which he had vindicated his conduct in running away from the fight; others, because of the license of his verses. He is said to have gained the laurel wreath at the Olympic games by an ode in honor of Hercules, but this is doubtful. Having returned to Paros, he took part in the war which broke out between it and Naxos, in the course of which he lost his life. The Delphian oracle, it was said, pronounced a curse upon his slayer. Variety, novelty, and satirical bitterness, of a narrow and personal sort, characterized his lyric poems, so much so that "Archilochian bitterness" and "Parian verse" became bywords in ancient times. He scourged his enemies in the most merciless fashion and always displayed the most malicious skill in selecting for his sarcasm the points on which they were most sensitive. It is said that Lycambes, who had promised his daughter Neobule in marriage to Archilochus, having failed to fulfill his promise, was so severely satirized by the poet that, to escape ridicule, both father and daughter hanged themselves. The ancients ranked Archilochus with Homer. They dedicated the statues of both on the same day and placed the head of Archilochus beside that of Homer on the same herm. As Homer was the creator of epic poetry, so Archilochus was regarded as the inventor of the poetry of the passions and of biting raillery, of iambic poetry; the iambic trimeter Archilochus brought to perfection. He became the model for the Old Athenian Comedy and for later poets—e.g., for Horace in his earlier period, that of the Epodes, which he sometimes calls *iambi*. He is said to have invented many new metrical forms, but his fame and influence were due primarily to his native genius. Only bare fragments of his compositions remain. They have been edited by Bergk, *Poetæ Lyrici Græci* (Leipzig, 1882).

**ARCHIMAGE,** är'kĭ-māj. 1. The foul magician who, in Spenser's *Faerie Queene*, assumes the guise of the Red Cross Knight and thereby entices Una from her search. He stands in the allegory for the personification of Falsehood. 2. The personification of Indolence in Thomson, *Castle of Indolence* (1748).

**ARCHIMANDRITE,** är'kĭ-măn'drīt (late Gk. *ἀρχιμανδρίτης, archimandritēs*, from Gk. *ἀρχι-, archi-*, chief + *μάνδρα, mandra*, a fold, i.e., a convent). The title of the highest order of superiors of convents in the Greek church, corresponding to abbot (q.v.) in the Latin church; except that, strictly speaking, an archimandrite presides over several monasteries, whereas the *hegumenos* was over only one, and so the latter was nearer to an ordinary abbot. The Russian bishops are chosen from among the archimandrites.

**ARCHIMEDEAN MIRROR,** är'kĭ-mē'dē-an. See MIRROR.

**ARCHIMEDES,** är'kĭ-mē'dēz (from *Archimedes' Screw;* see below). A genus of fossil Bryozoa of the family Fenestellidæ, common in some so-called "Archimedes Limestones" of the early Carboniferous Age in the Mississippi valley and in some of the southwestern States. The minute animals of this genus dwelt in colonies attached to the ocean floor and secreted a calcareous framework of spiral form, the axis of which resembles the Archimedes' screw (q.v.). Continuing the comparison, the thread of the screw is produced as a reticulated expansion, upon the upper surface of which are situated the cells that served as dwelling places for the individuals. The cell-bearing portion of the colony is seldom found connected with the spiral axis, having, by reason of its delicacy, been usually broken off by the action of the waves. Some

nearly complete examples have been found in the soft shales of the Keokuk group at Crawfordsville, Ind. See also BRYOZOA; CARBONIFEROUS SYSTEM; and for illustration, see Plate of POLYZOA.

**ARCHIMEDES** (Gk. *Ἀρχιμήδης, Archimēdēs*) (287–212 B.C.). A Greek geometrician and mechanician, the greatest mathematician of antiquity. He was born in the State of Syracuse, in the island of Sicily. He studied probably under Conon at the University of Alexandria, spending the major part of his life in Sicily. He was killed in the sack of Syracuse. The most important among his extant works include three on plane geometry, three on solid geometry, one on arithmetic, and three on mechanics. In the treatise on the measurement of the circle, the value of $\pi$ is given as a number less than $3\frac{1}{7}$ and greater than $3\frac{10}{71}$. He also gave formulas for the area of the circle and the ellipse, and for the sector of a spiral whose equation is $r=c\theta$. His demonstration that the area of a segment of a parabola is two-thirds that of the inclosing parallelogram is the first real example of the quadrature (q.v.) of a curvilinear surface. His method of exhaustion is suggestive of the modern methods of calculus. In the works on solid geometry are treated the volumes of spheroids and conoids. His arithmetical work, known by its Latin title, *Arenarius* ('sand-reckoner'), contains his famous attempt to express the amount of sand required to fill the universe. This work has given rise to the conjecture that Archimedes invented a new and powerful system of notation, all knowledge of which perished with the work itself. Besides his work in pure mathematics, Archimedes also made valuable contributions to applied mathematics, including applications of geometry to the theory of machines, as levers, pulleys, and screws. He also improved the methods of finding centres of gravity. In accordance with a wish of Archimedes, Marcellus raised in his honor a tomb, on which was engraved a sphere inscribed in a cylinder. Cicero, in his *Tusculan Disputations*, gives a charming account of his discovery of the tomb in 75 B.C. The most noted editions of Archimedes' works are those of J. Torelli (Oxford, 1792), J. L. Heiberg (Leipzig, 1881), and T. L. Heath (Cambridge, 1897).

**ARCHIMEDES, THE PRINCIPLE OF.** One of the most important principles in the science of hydrostatics, so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body, when entirely surrounded by a fluid, is buoyed up by a force equal to the weight of the fluid it displaces. This is an immediate consequence of the principles of fluid pressure, which prove also that the line of action of the upward force is vertically through the centre of gravity of the displaced fluid. When bodies lighter than water, are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves they rise to the surface and float, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own volume, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same density as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. Similar statements may be made with respect to bodies surrounded by other liquids or by gases, e.g., the atmospheric air. The buoyancy of balloons is an illustration of the principle of Archimedes as applied to the atmosphere. See HYDROSTATICS.

**ARCHIMEDES' SCREW** (called also SPIRAL PUMP). A machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Its simplest form consists of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis, as is shown in Fig. 1. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. The lowest bend of the tube will be filled with water, and if now the handle be made to turn in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend. The first bend has meanwhile

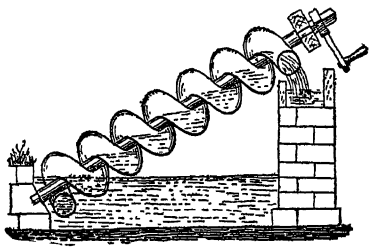


FIG. 1.

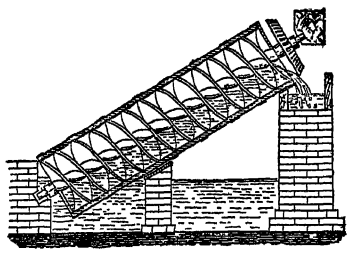


FIG. 2.

received a second charge, which, after a second revolution, flows up into the second bend and takes the place of the first charge, which has now moved up to the third bend. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution the lowest bend will be charged and the highest discharged. It will be seen that there may be room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines the cylinder itself is hollowed out into a double or triple-threaded screw, and inclosed in a watertight case, which turns round with it, the space

between the threads supplying the place of tubes. It is sometimes found convenient to fix the exterior envelope and to make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact, as is shown in Fig. 2. This modification of the Archimedes' Screw receives the name of "water screw," and frequently of "Dutch screw," from its use in Holland for draining low grounds.

**ARCHIPELAGO,** är'kĭ-pĕl'ă-gō (Gk. *ἀρχι-πέλαγος archipelagos*, chief sea, originally the Ægean Sea, to distinguish it from the other smaller Grecian waters; from *ἀρχι-, archi-*, chief + *πέλαγος, pelagos*, sea). A term now applied to any definite sheet of water interspersed with many islands, but formerly restricted to the Ægean Sea (q.v.), and its islands. The islands are usually divided into two groups, the Cyclades and the Sporades. Of the former group Delos, Lyra, Cythnos, Thera, Andros, and Melos are more prominent; of the Sporades, some of which belong to Turkey, Rhodes, Cos, Patmos, Samos, and Lemnos are the more significant. They are of volcanic origin, have a healthful climate and beautiful scenery. These islands have played an important part in the course of Greek history. For a more detailed description, see CYCLADES; SPORADES; and individual islands.

**ARCHITECTS,** är'kĭ-tĕkts, AMERICAN INSTITUTE OF. A society established in 1857. In 1912 it had 34 chapters, 303 fellows, 678 members, and 59 honorary members.

**ARCHITECTURE,** är'kĭ-tĕk'tŭr (Lat. *architectura*, Gk. *ἀρχιτεκτονία architektonia*, from *ἀρχι-, archi-*, chief + *τέκτων, tektōn*, worker in wood; carpenter, craftsman). In its widest sense this term includes any kind of building such as works of military and naval construction and civil engineering; but, strictly speaking, it is building raised by certain æsthetic qualities to the rank of art, as distinguished from purely utilitarian or mechanical building. Its name shows that it was regarded by the ancients as the chief art, comprising all others, the architect being director of works, and responsible for whatever sculpture and painting was used in connection with the building. This ancient tradition ruled throughout the Middle Ages, and it was not until the Renaissance in the fifteenth century that architecture lost its right to govern the other arts. Because architecture had this character of the most universal art, using sculpture and painting in subordination, the formation of what we call an architectural style—like the Greek or the Gothic style—was a complex and gradual process. For architecture, being one of the earliest and most constant expressions of civilization, is not the artificial product of the free conception of a few artists, but is fundamentally affected, on the one side by the religious and social elements of society, whose demands it must meet, and on the other by the material elements such as the influences of climate, of materials of construction and decoration, which limit or in certain directions stimulate artistic originality. So that in every age architecture is a faithful mirror of contemporary society, and at once the most material and the most ideal of the fine arts.

**Egypt.** In respect to historic development, Egypt and Babylonia—the valleys of the Nile and of the Tigris and Euphrates—are rivals for seniority in the field, which they seem to have held alone for one or more thousand years, while the rest of the world went without architecture. It is true that the extant monuments of Egypt between c.5000 and 2500 B.C. are works of mere building rather than of art. The pre-pyramidal tombs, the pyramids themselves; the primitive chapels or temples connected with them (such as the "Temple of the Sphinx"); the early mastaba-tombs and all other works of the Ancient Empire, have few truly architectural features. The pyramids, temples, and tombs have no moldings, decorations, or details that indicate style. It is incontestable that palaces and temples existed in this early age, but the use of perishable materials and subsequent rebuildings doubtless account for their total disappearance. It is only in the Middle Empire (c.2200) that the type of columnar temple was evolved, which became the glory of Egypt, and that tombs were made—as at Beni-Hassan (see TOMB)—where there were columns and other features with a distinct artistic character—such as the "Doric" type, and the clustered-palm type. The destructive invasion of the Shepherd Kings has forever obscured this second stage of Egyptian architecture, and for a knowledge of its possibilities the Golden Age is that of the New Empire, especially between c.1600 and 1300, supplemented by the much later constructions of the Ptolemaic Age, almost equally magnificent. Some of the temples were entirely excavated in the rock like those at Abu-Simbel (q.v. for illustration); others were partly excavated, partly structural, as at Deir-el-Bahari; but the great majority were built entirely in the open and of stone masonry. A few are sepulchral temples, such as the Ramesseum (q.v.) of Rameses II near Medinet Habu, but with these exceptions they are purely temples to the gods. Each temple of the usual type was approached through a long avenue of sphinxes or statues, was preceded by an immense façade of pylons connected with an encircling wall, with an open columnar court, at the opposite end of which was a hall of columns forming the prelude to the sekos or dark inner sanctuary. This is undoubtedly the earliest conception of a large columnar interior in architectural history, and though its proportions may be heavy, the composition was artistic and imposing, and both sculpture and color were used with architectural details to enhance the effect. Karnak, Luxor, the Ramesseum, Edfu, and Philæ are the masterpieces of a period covering some 1500 years (for illustrations of EDFU and LUXOR, see those titles). No vaults or arches were used in any part of this architecture—only the straight lintel, the column, and sometimes piers fronted by figures of Osiris. The heavy columns, of so many forms as to rebel at any classification by orders, were placed very close together, so that the effect was not one of spaciousness.

**Babylonia and Assyria.** The beginnings of Babylonian architecture are, like those of Egyptian art, lost in the mists of antiquity, but it reached its full development long before the Egyptian, and, while the latter remained isolated, stood at the head of a long architectural genealogy, for Elam and Assyria literally copied it; Persia, the Hittites, the Phœnicians and other nations borrowed from it, and its influence was felt even to China and India. Through nearly 5000 years previous to Nebuchadnezzar's time this architecture underwent little change. There could be no sharper contrast than that which it presents to Egyptian types. Owing to the lack of stone and scarcity of timber, brick,

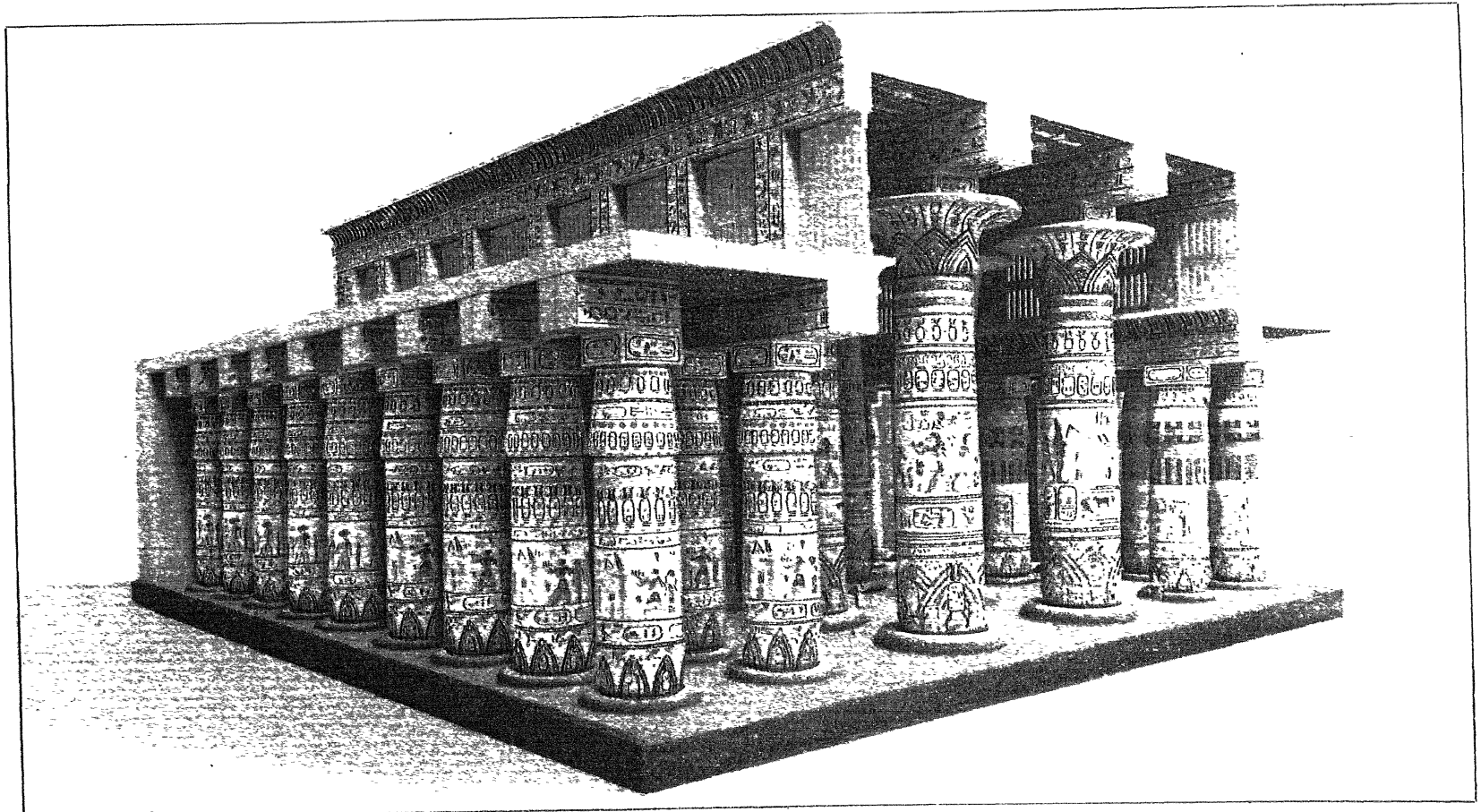
for the most part sun-baked, was the chief building material. Hence the arch and vault, carried by massive walls, took the place of the stately pillared halls, stone lintels and ceilings and sculptured piers and columns of Egypt. The temples had no large interiors, but were stepped pyramids, remarkable mainly for their great height, their external mass, and the brilliant coloring of their receding stories, faced with glazed tiles. Only in the royal palaces did the Babylonians excel, creating a type which the Assyrians developed with numerous halls and chambers grouped around three main courts. The palace at Tello, the temples at Erech and Ur, give the usual types; but the excavations at Nippur and Babylon have disclosed other splendors. Meanwhile the better preservation and more thorough study of the Assyrian ruins enable us to judge somewhat of the details of the earlier style. The temple observatory and the palace of Sargon at Khorsabad were destroyed by some great catastrophe—probably by fire—while they were still occupied, perhaps at the time of the fall of Nineveh; but their plans and decoration in sculpture and color can be reconstructed from extant remains. Glazed bricks and tiles and alabaster slabs carved in relief were the chief means of adornment. Neither the palaces nor the temples, however, could approach the monumental grandeur and stateliness of Egyptian architecture.

**Hittites and Phœnicians.** The Hittites, the rivals of both Egypt and Assyria, were great builders; like the Egyptians, they used stone and were constructors of fortresses. Of their temple architecture little is known; but their palaces—one of which has been excavated at Senjerli and another at Boghaz-Köi—appear to have been of a type similar to the Assyro-Babylonian. Their works were scattered from the confines of Assyria to the Syrian coast and as far northwest as the interior of Asia Minor. Of the architecture of the Phœnicians very little remains; they also built in stone, and like the Hittites used at first the Cyclopean and polygonal masonry. The great fortifications and ports of Arvad, Tyre, Sidon, and the colonies of Africa and Italy show that the utilitarian side of this architecture was more developed than the religious; for the temples themselves were but small shrines, none of them equaling, apparently, the temple of Jerusalem in size and splendor, though the actual work on this temple was done by Phœnician artisans and artists.

**The Ægean Style.** It was the migrating Pelasgic tribes of Asia Minor, the Mediterranean islands, Greece and Italy, whose works formed the first link between these early architectures of western Asia and that of the pre-Hellenic and Hellenic world, forming what is called the Ægean style, which flourished mainly between c.2000 and 1000 B.C. The cities of Crete, as Cnossus, and of other islands, of Troy and other cities in Asia Minor, Tiryns, Mycenæ, Argos, and others in Greece, besides many early Italian cities, such as Norba and Lignia, show how impressive and rugged a style of construction was combined by these races with a delicate and varied decoration, especially in the bee-hive domical tombs (Mycenæ, Thoricus, Vaphio, etc.) and in the royal palaces, which were as important in their way as those of the Assyrian kings.

**Persia.** The second connecting link was Persia. Its great palaces and tombs at Susa, Persepolis (q.v. for illustration), Meshed Murgab, and Pasargadæ, with monuments from Cyrus to Artaxerxes, show the influence of Egypt in their great columnar halls—though they are far more spacious and light than the Egyptian—of Babylon and Assyria in the use of brickwork, sculptured colossi, and friezes of reliefs, and in the curious double-animal capitals and the enameled tiles. From Lycia and the Greeks of Asia Minor came the high stone basements for their structures, the flutings of their columns, and many details. The hall of Xerxes at Persepolis is more than twice the size of the great hall at Karnak, and shows how such columnar interiors, once introduced into western Asia, were appreciated and developed. The later dynasties of Persia—both Parthian and Sassanian—threw off many of these foreign elements in a tendency to return to the brickwork, the domes, vaults, and arches of truly Oriental type, as can be seen in the palaces at Sarbistan, Firuzabad (q.v. for illustration), and Ctesiphon.

**Greece.** Meanwhile, even before the rise of Persian architecture, the Greeks had originated the Doric and Ionic (for illustration, see these titles) orders in all their essential features. The temple, which is the one central type in this architecture, appears to have developed out of the main hall of the Pelasgic royal palace, as it is seen in Crete, Troy, Tiryns, and Mycenæ, through a middle stage of crude brick walls, wooden columns, architraves, and gables, with terra-cotta revetment and decoration, into the final type of stone temple which was reached as early as the seventh century B.C. It is in Sicily and southern Italy that the earliest works of the Doric style are to be found (Syracuse, Selinus, Metapontum), while the earliest Ionic temples were in Asia Minor, at Samos and Ephesus; but these hardly rival the Doric in age, and their ruins do not belong, like those of the Doric temples, to the primitive structures. The normal type of these temples was a building raised on a three-stepped platform, and consisting of one main cella-chamber (*naos*) usually supplemented at one end by a smaller chamber (*opisthodomos*), and preceded at the other end by a pronaos, the whole being surrounded by a colonnade on all four sides, surmounted by an entablature and covered by a gabled roof terminating in pediments (q.v.). The æsthetic Greeks did not plan great columnar halls or courts like those of the Egyptian temples, but relied on external effects almost entirely; on refined beauty of outline and proportion. Never, until the period of decadence, was there any attempt at impressive size. The Doric style was heavy in proportion and plain in ornament, in comparison with the Ionic, but provided for more considerable figured sculpture in the friezes, metopes, and gables. It prevailed at first over nearly the entire Hellenic world, gaining gradually in delicacy and lightness, especially when handled by artists with Ionian blood, as was the case at Athens, which contains in the Parthenon and the Theseum the two finest works of the developed Periclean Age, though they are almost rivaled by some Italian and Sicilian works, such as the temples of Pæstum (q.v. for illustration) and Girgenti. At this time other works, such as the Propylæa at Athens, became worthy to stand beside the temples, and here the two styles—Doric and Ionic—were for the first time combined. The originality and daring of this Attic school were also shown in the Porch of the Maidens in the Erechtheum (q.v. for illustra-



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TEMPLE OF KARNAK, FROM THE RESTORED MODEL
IN THE METROPOLITAN MUSEUM OF ART, NEW YORK

tion). The succeeding Age of Praxitcles, and the Alexandrian Period brought even slimmer Doric proportions, increased favor for the more decorative Ionic style (temples of Miletus and Ephesus), development of the still richer Corinthian order (see COLUMN), and of colossal forms of public, civil, and sepulchral architecture (such as the propylæa, theatres, odeons, stoas, the altar at Pergamus, the mausoleum of Halicarnassus), in which Oriental splendor and love of the colossal overruled Hellenic restraint.

**Rome.** This prepared the way for Roman architecture. In the Royal and Early Republican Periods Rome had followed the Etruscan and Latin types: wooden temples with terra-cotta revetments in a *quasi*-doric style and civil structures of stone, vaulted and arched. These two types remained fundamental, except that before the close of the Republic stone had replaced wood and terra-cotta in the temples, the Ionic style had been introduced by Greek artists, and the Greek column and entablature had been added as a surface decoration and reënforcement to the constructive arcades in secular buildings. The Greek spirit informed the Roman in the sphere of art, without conquering it, for ordinarily it is not difficult to distinguish the two styles. The Roman temples are rarely peristyles, but prostyles, with a very deep portico or pronaos in front, and this alone would be sufficient to make their appearance differ fundamentally, even without the substitution of the richer and more slender Corinthian and Composite forms for the Doric and Ionic. But the true nature of Roman architecture appears in its civil structures: in theatres and amphitheatres, aqueducts, triumphal arches, palaces, villas, and, above all, in the baths or thermæ. The Roman genius for composition shines in such great combinations of structures as the Villa of Hadrian, the Palace of the Cæsars, the Forum of Trajan (see FORUM), and the Baths of Caracalla and Diocletian. And the great vaulted interiors of some of these buildings, such as the Basilica of Maxentius and the Baths of Caracalla, surpass anything previously conceived of in architecture. It was, indeed, the Romans who first conceived the design of vast unencumbered interiors with lofty roofs, and the grandeur of the circular Pantheon of Hadrian (120 A.D.) has never been surpassed. With the Greeks, architecture had been plastic; with the Romans, who developed the ideals of the Alexandrian Greeks, it was pictorial. It also combined, in the highest degree, utility and comfort with imposing and costly appearance. The whole civilized world was filled with the monuments of this art, which fell heir to the cultures of both the Orient and Greece.

**Early Christian.** With the advent of Christianity architectural development coincided with the building and decorating of churches. The public basilicas of Rome and the basilical halls of private houses offered admirable prototypes for the Christian halls of worship. The early Christian architecture, with thin brick walls, wooden ceilings, and long colonnaded interiors, at first prevailed everywhere, poverty of architectural form and detail being partly concealed by rich mosaic and marble ornamentation.

**Byzantine and Basilical Styles.** As early as the sixth century, however, the Oriental constructive spirit asserted itself once more in the Hellenic Provinces, and two sharply contrasted styles henceforth flourished side by side: the wooden-roofed Latin basilical architecture in the West, especially in Italy,—Rome, Ravenna, Salonica, central Syria, North Africa, being full of early basilicas; while in the East, especially Constantinople with St. Sophia (q.v. for illustration) the Byzantine architects developed a new type of church, wholly of masonry of brick or stone, in which a dome borne on pendentives was the central feature. (See DOME.) Ravenna, Greece, Asia Minor, and Syria possess numerous Byzantine churches; but the richest and finest of Byzantine churches, next to that of St. Sophia, is the church of St. Mark at Venice, dating from 1047. While the Byzantine style underwent, in the course of succeeding centuries, certain changes, such as the heightening of the drums of the domes, the decoration of the exterior with marble or alternate courses of stone and brick, the use of accessories like porches, colonettes, etc., these differences were of minor importance.

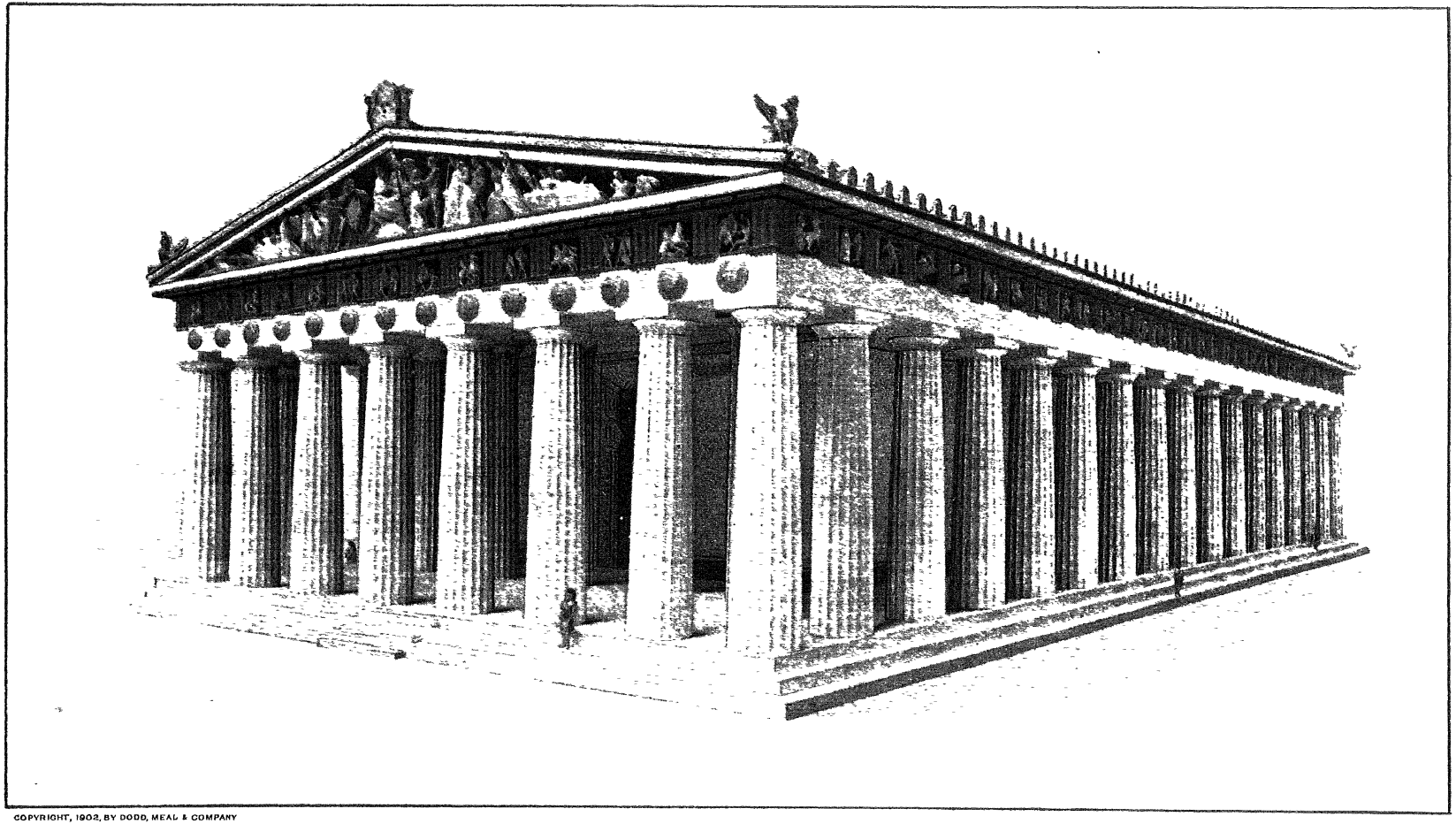
**Mohammedan.** In the West, on the contrary, the new civilization resulting from the awakening of the northern races in the eleventh century and their fusion with the old stock created for itself a new architecture of which the first phase is called Romanesque, the second Gothic. But before describing its characteristics, a phase of Oriental architecture which arose in the meantime must not be omitted—that of the Mohammedan peoples in the great empire founded by the Arabs in the seventh century. Syria, Palestine, Persia, Egypt, North Africa, Spain, Asia Minor, and other lands, wrested mainly from the Byzantines, were filled with monuments of a varied and rich style, based primarily on Byzantine and Persian models adapted to new purposes and different ideals. The mosques, mausoleums, minarets, khans, hospitals, bazaars, palaces, oratories, and fountains form a varied group of buildings. The Moorish school of Spain from the time of the mosque of Córdova to the Alhambra (q.v.) of Granada; and the Egypto-Arabic school of Cairo, from the mosques of Hassan and Tulun to that of Kaït Bey, are the best known; but the Syrian and Palestinian school, centred at Damascus, and the Persian school, centred at Bagdad and Ispahan, were fully as important—the latter sending out offshoots as far as distant India and Asia Minor. The development of the dome, the stilted, horseshoe and pointed arches, stalactite vaulting, geometrical decoration, particularly in brilliant faience and mosaic—these are characteristics of the Mohammedan schools. The Golden Age began in the tenth century. The dominant type of mosque comprised a cloistered court leading to a low pillared hall of many aisles, as in the mosques of Kairwan, Damascus, and Cairo. The dome, at first used solely over the tomb in sepulchral mosques, was later used over the prayer-hall also, as in the famous Aksa Mosque and Dome of the Rock at Jerusalem. In the eleventh century the final fixed types had been reached; the minaret had become an essential adjunct; the geometrical style of ornament was complete with its bewildering tracery, and the dome had triumphed over the flat ceiling. In India, especially under the Moguls after 1494, the Persian forms of dome, minaret, and arch were blended with many Hindu features in magnificent mosques, palaces, tombs of sandstone and marble, of which the Taj at Agra (q.v.) is the most perfect example. The latest addition to the artistic heritage was through the Turkish conquest of Constantinople in the fifteenth cen-

tury, which led to a return in even greater force of the primitive influence of Byzantium.

**Romanesque.** Meanwhile Europe had enjoyed the architectural revival of the Romanesque Period. First Italy, then Germany and France, and finally England and Spain had felt the new artistic currents. There were no national styles, far less was there any unity throughout Europe. Each province had special characteristics. In parts of Italy, such as Tuscany and Rome, the arrangement of the early Christian basilica was preserved almost intact with the added enrichment of marble and mosaic incrustations and new architectural details. It was the same in most of Germany and northern France until the twelfth century. Some sections, as Venice and Sicily, were even strongly affected by Byzantine art. But the most fertile novelty of the age was the development of the vault, which found expression particularly in central and southern France and northern Italy. The dome (Périgord), the tunnel vault (Provence, Burgundy, Spain, etc.), and the groin or cross-vault (Lombardy) were all successfully used to cover churches of the basilical type of plan. The future of architecture lay in this development. Gradually the ribbed groin-vault gained the supremacy and spread to Germany, Normandy, and other provinces of France, preparing the way for the Gothic style. The great crypts, the porches, towers, façades of rich and varied types, a decoration of figured and ornamental sculpture, made possible by the use of stone in place of brick, were among the prominent features. This phase of vaulted Romanesque was rich, heavy, and impressive. It was particularly the style of the monastic orders.

**Gothic.** Out of it there gradually grew, in the course of the twelfth century, in the north of France, the Gothic architecture (q.v. for illustration), the perfect embodiment of vaulted constructive design (see VAULT) formed of three main elements: ribbed groin-vaults to cover the interior spaces; piers to receive their vertical weight; and flying buttresses, to transmit and resist their thrusts. The last-named feature, the flying buttress, or, more properly, the flying arch and buttress, was the culminating invention of the Gothic designers. It was the outcome of nearly a century's experiments in the effort to devise some means of adequately resisting the powerful outward thrusts of the high central vaults of nave and choir, without increasing the massiveness of the internal piers separating the aisles on which these vaults rested. By the flying arches these thrusts are transmitted to the massive buttresses built outside the side aisles, and the internal piers have to support only the vertical weight of the vaults. It was an anticipation of modern engineering principles. Thus resulted a species of stone skeleton which, when perfected, freed architecture from the thraldom of heavy walls; hence the development of large windows with their tracery and stained glass, the slender piers, the lofty vaults. The new style was hailed everywhere and spread from the region of Paris gradually over Europe, being best understood in Spain and England, less so in Germany, and least of all in Italy. It coincided with the bloom of mediæval sculpture, which remained the handmaid of architecture, contributing to the rich harmony of the style. For the first time since Roman days, a single general style prevailed throughout western Europe, though varied in detail by local schools and national peculiarities. The typical cathedrals are those of Paris, Amiens (q.v. for illustration), Rheims, and Cologne (the latter completed, however, only in recent times), having great choirs with radiating chapels and aisles, a transept with façades, a nave with two or four side aisles, a western façade with two flanking towers. Single towers in the centre of the front, as at Ulm; square screen façades, as at Peterborough; plain, square-ending apses, as often in England—all such features are variations from the orthodox French type. So are the many cases, especially in Italy, where wooden roofs in place of ribbed vaults are used with Gothic forms, but in violation of Gothic principles. The development of the Gothic styles was progressive. The French churches of the twelfth century retained many Romanesque forms and heavy proportions, as at Sens, Senlis, Noyon, and Laon. Larger windows and lighter tracery, more slender proportions, and greater height of vaulting came with the Golden Age of the thirteenth century, with Notre Dame in Paris (1163–1230), Chartres, Rheims, Amiens, and St. Denis. The attenuated geometric style reigned in France in the fourteenth century; then the flamboyant until the sixteenth century. In England the Early English corresponds to the thirteenth, the Decorated to the fourteenth, and the Perpendicular to the two succeeding centuries. Other countries had corresponding but less clearly marked divisions. The general tendency was increase of decorative richness and variety of form, a loss of scientific as well as artistic values, the invasion of prettiness in place of breadth and strength.

**The Renaissance.** Although Italy had created some large monuments in a *quasi*-Gothic style, monastic churches, such as Santa Croce and Santa Maria Novella in Florence, and the Frari in Venice; cathedrals, such as Siena and Milan (q.v. for illustration), Italian artists were prepared for the Renaissance style introduced by Brunelleschi and his followers early in the fifteenth century, a style based on the study of Roman monuments adapted to mediæval needs. The new style employed the dome very successfully in its churches, but it was preëminently a decorative and not a constructive style, and, like the Roman architecture which it followed, found its best expression in civil, not in religious monuments. Single artists stamped their works with a special style. Brunelleschi, Alberti, Bramante, Sansovino, Michelangelo, Palladio, are not merely names—they are types. The Roman scheme of using the constructive arch within a decorative framework of pilasters or columns and entablatures became a Renaissance commonplace. The palaces and civic buildings of Florence, Rome, Venice, Lombardy, Genoa (for illustration, see these titles), represent the essential features of the style rather than such churches as those of Santo Spirito at Florence, St. Peter's at Rome, La Salute at Venice. Although early Renaissance decoration is exquisitely delicate, later developments tended first toward magnificence and later toward coarseness and final vulgarity. The imitation of classic art was at first not complete; Alberti aimed at it, but it reached its cold perfection only under Palladio, just before the opposite school of fantastic irregularity, called the Baroque, came to the front before the close of the sixteenth century. The style was at first almost entirely in the hands of Florentine artists, who introduced it everywhere; then the



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THE PARTHENON, FROM THE RESTORED MODEL
IN THE METROPOLITAN MUSEUM OF ART NEW YORK

Lombards took the lead under Bramante, with a branch in Venice; finally the Roman school, with Michelangelo, Raphael, Vignola, and many others, obtained supremacy.

Meanwhile the Renaissance style was spreading over Europe, where it first blended with and then superseded Gothic. This occupied nearly the entire sixteenth century, for although it penetrated to France about 1500, it did not obtain national foothold in Germany until about 1550, nor in England much before 1600. In none of these countries was it used in its original purity, being everywhere affected by national peculiarities. The most artistic changes were those in France, whose château architecture, especially in the Loire region and near Paris, produced masterpieces of composition worthy of comparison with the best Italian work. Blois, Chambord, the Louvre, the Tuileries, the Luxembourg, and Versailles form an unsurpassed series. For illustrations of the Louvre, the Luxembourg, and Versailles, see these titles.

Germany was more foreign to the classic spirit; and the percentage here and in England of purely classic design was much smaller than in Italy or France. The classic orders were less frequently used, and architecture retained more mediæval features. The most interesting classes of buildings in Germany during the latter sixteenth and early seventeenth centuries were the princely castles and residences, of which the finest example is the Heidelberg Schloss; and the town halls, like those of Altenburg, Bremen, and Augsburg.

The Renaissance in Italy produced a codification of Roman architectural principles (of Greek types nothing was known) which was embodied in a series of books, the most important being the *Regola delle cinque ordini d' architettura* of Giacomo Barozzi da Vignola (1507–73) (q.v.). On these books was based the practice of Europe in the seventeenth and eighteenth centuries. In Italy the purest classic type prevailed during the latter part of the Renaissance. Bramante employed Roman details with great elegance and purity, as did also his successors, Peruzzi, Antonio da San Gallo the younger, Palladio, and especially Vignola and Giacoma della Porta, who assisted Michelangelo on the dome of St. Peter's and the Capitol in Rome. Toward the end of the sixteenth century there also appeared a tendency toward extreme freedom in decoration, producing the so-called Baroque style (see BAROCCO), which ultimately caused the degeneracy of Italian architecture. Until, and to some extent during, the time of Bernini (1589–1680), however, the Baroque is quite in harmony with the revived Roman style and lends piquancy to it; as in Bernini's colonnade before St. Peter's.

The Italian classical movement was continued in France. At first felt in the sixteenth century in the work of Pierre Lescot at the Louvre, Jean Bullant at Ecouen, and Philibert de l'Orme at the Tuileries, its influence increased until the middle of the seventeenth century and culminated in the prodigious undertakings of the reign of Louis XIV (1643–1715), at Versailles, Marly, Trianon, and Paris. The movement affected not only the buildings themselves but their emplacement. The large lines of the plan of Paris may be traced to the reign of Louis XIV.

The principles established in the seventeenth century continued in the eighteenth and developed into the current French architecture of the present day. French decoration is, in large measure, an adaptation of the Baroque style and has passed through phases which correspond to the reigns and have taken the names of succeeding monarchs—style Louis XIV, Louis XV, Louis XVI. (See Rococo.) French architecture crystallized about the formation of the Académie Royale d'Architecture in 1671, which is now merged with the Institute. Its school is perpetuated in the Ecole des Beaux-Arts (q.v.).

In England the course of revived classicism had not the strength developed in France, but it received a powerful impulse from Inigo Jones (1573–1652) and his follower, Sir Christopher Wren (1632–1723), the great architect of St. Paul's Cathedral, who was contemporaneous with the reign of Louis XIV. It derived also a certain consistency from the use of the book and drawings of Palladio, introduced by Richard Boyle, Earl of Burlington (1695–1753). The term "English Palladian" applies well to work done until after the time of Sir William Chambers (1726–96). The German people during the seventeenth and eighteenth centuries produced much interesting architecture, but developed little which is characteristically national. They yielded easily to Italian and French influences.

Throughout the early part of this period Flanders and Holland adopted the classical and Baroque traditions of Italy, with which country they were in close commercial relations. The architecture of Spain in the sixteenth century developed a peculiar form of Renaissance called Plateresque and in the seventeenth and eighteenth centuries is a picturesque outgrowth of the Italian Baroque. See CHURRIGUERESQUE.

**Colonial Architecture.** In general this name is applied to the architecture of any colony which reflects the contemporaneous work of the mother country. It is here used of the very important Colonial styles developed in the Americas during the eighteenth century.

The Spanish colonies, especially Mexico, produced interesting architecture directly derived from the late Baroque buildings of Spain, sometimes called Churrigueresque (q.v.) which was, doubtless, occasionally executed by native workmen with Aztec traditions. As in Spain, it shows a tendency to concentrate decoration at points, as about doors or towers, where it is contrasted with large, plain wall surfaces. There is also a brilliant use of colored tiles. Mexican architecture is famous for the development of the low Spanish domes, of which there are many fine examples by the native architect Tresguerras. In the neighborhood of southern California the use of sun-dried brick (adobe) gave origin to a unique form of Spanish-Colonial which is called "Mission Architecture."

The term "Colonial" (sometimes also "Georgian"), as applied to the English colonies, includes all the work done under the influence of English examples in the eighteenth and early nineteenth centuries; chiefly, that is, during the reigns of the four Georges. Unlike the Spanish the northern buildings are elegant, precise, and a little dry in style, with a decided leaning toward classicism, not in accuracy of design but in purity of line and proportion. Before 1730 building was confined to dwellings, chiefly of wood. As the country became settled and it was possible to build with more elegance, carpenters and builders instructed themselves by the use of English architectural books by Sir William Chambers and others, or compilations from them, which fixed the practice at least in the northern

colonies. Perhaps the most interesting product of the New England Colonial style is the series of charming meeting-house steeples suggested by the spires of Sir Christopher Wren's and James Gibbs's churches in London.

In New York and the middle part of the country there is the same adaptation of English details, but with broader and richer effects. In the South, where brick was quite generally used, the ample country residences gave fine opportunities.

Colonial architecture was influenced to a slight degree by French practice. From 1784 to 1787 Thomas Jefferson was Minister to France, and not only took much interest in architecture, but also assisted young American architects, like Charles Bulfinch (q.v.), in their studies. In the buildings which he superintended, however, his house at Monticello, Va., and the University of Virginia, he followed English text-books chiefly. A French draughtsman named Mangin was employed on the City Hall in New York, finished 1811, but the actual architect was John McComb. An able Frenchman, Pierre Charles l'Enfant, made the plans according to which the city of Washington was laid out.

The Capitol at Washington, although the dome and wings were built in the nineteenth century, may still be considered the chief Colonial monument, the central part being the work of architects trained in the eighteenth century.

**The Nineteenth Century.** The regular sequence of developing styles ceases in an abrupt way with the wars of the French Revolution. Before that time no style of architecture had ever existed which was not in the main the result of natural evolution. Since the close of the eighteenth century, however, there has occurred a series of imitative fashions chasing one another rapidly across the background of equally mutable social conditions.

The first of these fashions is the so-called *Style Empire*, the character of decorative design influenced in part by new study of Roman antiquity and partly reproduced from the work of the preceding reign and fitted to the grandiose requirements of Napoleon's brief dominion. The French Republic had shown a marked deference to what were supposed to be the thoughts and ambitions of the Roman Republic, and a fancied attempt to reproduce the Roman forms is evident in all the work of the Napoleonic epoch. This, however, applies only to the larger masses, for in the furniture and metal work of the time there is more of Louis Quinze than of Æmilius Paulus—a formalized rococo rather than a modernized Greco-Roman style. The endurance of this fashion was brief, however. The Arc de l'Etoile and the great Church of the Madeleine in Paris were begun and their character determined during this period. Also the character which we associate with Paris of wide and elegant avenues was fixed by Percier and Fontaine, although such arcades as those of the Rue de Rivoli and the Rue Royale were not destined to become a favorite addition to important streets. The influence of the Empire style was hardly felt outside of Paris; and for succeeding students it has been rather a fashion in costly furniture and the hanging of walls with silk than an architecture of dignity.

With the return of peace there came to Europe a long period of singular artistic sterility, due in part to the extraordinary changes, political, social, and above all industrial, of that period. In Great Britain and Germany and later in the United States, the study and imitation of Greek architecture were stimulated by the publication of several remarkable books, which for the first time made known to the world of culture the real form and aspect of the Greek monuments. Certain phases of imperial Roman art were also thus published to the world as models for imitation. Under these influences there were built Greek and Roman porticoes with square box-like churches or commonplace public buildings behind them, such as the British Museum and St. Pancras's Church in London. Smaller churches of this sort are somewhat abundant in Great Britain and in America, where the Greek details were applied with considerable taste and ingenuity to secular buildings as well as to churches. Unfortunately, both in England and the United States, the use of lath-and-plaster and of other cheap substitutes for fine materials became very generally prevalent. Architecture had, indeed, become to the general mind a mere matter of external dress and superficial aspect, not of fundamental structural design. In the absence of any true appreciation of the real problem of architecture, it was thought quite sufficient to dress a building, planned without taste and cheaply constructed, in the garb—so far as colonnades and decorative details were concerned—of the refined and perfect Greek architecture, or of the stately and impressive Roman style. But such a method of design could never produce really fine buildings nor remedy the essential incongruity between the structure and its dress. The Greek Revival of England, Germany, and the United States, and the Roman copyism of France and the rest of Europe, failed to rescue architecture from its banality and lifelessness. No new style and no vital and rational architecture could result, though some of the products of these movements—the British Museum at London, the St. George's Hall at Liverpool, the Ruhmeshalle at Munich, for instance —were at least externally dignified and decorative in effect.

During the same period (1825–50) in which one group or school of architects were thus copying Greek and Roman façades, another group in England were preaching the revival of the Gothic style as the only hope of architecture. In their eyes the classic styles represented paganism and an alien civilization; the English Gothic was a national and Christian architecture, and for churches and schools, at least, the only rational and appropriate style to copy. Like the neo-classic movements, this was really an intellectual and sentimental rather than an æsthetic propaganda. Not the thoughtful designing of buildings as to plan, construction, and decoration, on principles of sound reasoning guided by a cultivated taste, but the copying of the forms of some dead style or the imitation of ancient buildings, was still deemed the proper path to follow. Hence this movement, like the other, though promoted with enthusiasm by men of sincere purpose, lofty aims, and high culture, failed to produce either a new style or a really vital revival of an old one. The progress of archæology led, however, to increasing consistency and correctness of design; while in the second phase of the movement, from 1850 to 1870 or 1880, greater intelligence and freedom in the adaptation of details and originality in the invention of new combinations, the following of

Italian Gothic models in much of the secular architecture, and a great and general improvement in the arts and crafts of building, led to the erection of many interesting and highly ornate buildings. As was to be expected, the best results were attained in ecclesiastical and scholastic edifices, but the Houses of Parliament by Sir Charles Barry (see WESTMINSTER PALACE), the Assize Courts at Manchester and several town halls, are also in many respects worthy of admiration. The name "Victorian Gothic" is often applied to the later phases of the movement.

In France there was no parallel to either of these developments. The so-called Neo-Grec movement, led by Duc, Duban, and Labrouste between 1830 and 1850, was a concerted effort by these able architects to introduce more of Greek refinement and of personal originality into the official and public architecture of France, wholly dominated at that time by the rigidly classic Roman teaching of the Ecole des Beaux-Arts. Complete freedom in the handling of the orders as well as in the general composition of architectural designs, and a refined but somewhat dry treatment of profiles and other details, characterized the work of these men in the court of the Beaux-Arts, the column of the Bastille, the west wing of the reconstructed Palais de Justice, and the Library of St. Geneviève. These works strongly influenced the successors of Duc, Duban, and Labrouste and introduced into the French architecture of the period 1850–80 a new element of flexibility and elegance not found in the more purely archæological or the utterly commonplace contemporary architecture of other countries. Meanwhile, however, under the Second Empire of Napoleon III (1852–70), a new and more powerful tendency appeared in the admirable work of Visconti and Lefuel, to whom was intrusted the completion of the Louvre (q.v.). In this they followed, not blindly but with careful regard to the spirit and character rather than the detail, the models left by Lescot in the Court of the Old Louvre: that is, the best work of the style of Henry II. Nearly all public and monumental architecture in France has since been either in a free version of this style, or inspired from that of the preceding reign (Francis I), but modified and adapted to modern uses with a skill and good taste which are characteristic of the French among modern nations. Another important building which has strongly influenced later French architecture is the Opera of Charles Garnier, an over-ornate but admirably composed design. In the adornment of buildings with decorative sculpture externally and with mural paintings within, the French stand far ahead of all their contemporaries. A disturbing element in the evolution of modern styles has been the invention or adoption of new materials and processes of building, to which it was difficult to adapt the forms of the traditional styles, while architects trained in these lacked the courage and resource to evolve rational new forms and combinations suited to the new requirements. After all, styles and details are not made in a day, and the best architecture has always been the product of slow evolution from traditionally accepted forms. The introduction of iron and steel columns and trusses, making possible the light and broad-spanned roofs of modern railway stations and armories, was due to the engineers first of all, and architects have been slow to make these new resources serve highly æsthetic ends. The recently developed vogue of concrete, and adoption of steel-frame construction for very lofty buildings, have introduced new problems with which architects are still struggling with more or less success. In spite of the persistence of historic style forms, the modern buildings that have resulted are wholly unlike any that have preceded them and reveal the evolution of a new style, not in the details used so much as in the use made of the details. An earnest of this modern style is seen in the Library of St. Geneviève, Paris, with its internal iron columns and light trussed arch-ribs, though this dates back to about 1845–50. The great groups of exhibition buildings at Paris in 1889 and 1900, at Chicago in 1893 and at St. Louis in 1904, and the recently completed Pennsylvania Terminal at New York exhibit various phases of this development. (See STYLE.)

In the United States, with the decline of the Greek Revival, a period of architectural sterility supervened, which lasted until about 1880. The Greek movement left behind it a considerable number of buildings which, in spite of the fundamental error underlying the movement, were dignified in mass, refined in detail, and solid in construction, e.g., the Washington Capitol, Treasury and Patent Office, the Marine Exchange and Girard College at Philadelphia, the Custom House at Boston, and many others. The period that followed was destitute of guiding ideas, taste had sunk very low, politics and the conquest of the wilderness of the West occupied all minds; and then came the desolation and exhaustion of the Civil War, followed by wild speculation and the panic of 1873. There were but a handful of trained architects in the country. The official architecture of governmental buildings of that time is exemplified in the State, War and Navy Departments at Washington, the Post Office at New York, the City Hall at Philadelphia, and the State Capitol of New York at Albany—dull and heavy designs, badly planned, mechanically executed; supposedly "inspired" from contemporary French architecture! But new agencies had been set in motion tending to better things: museums of art (the Metropolitan of New York dating from 1871); the influence of several strong men trained in Paris, the increasing tide of European travel; and the new prosperity which, after the completion of the Union Pacific Railroad in 1869 and final recovery from the panic of 1873, furnished new resources with which to meet new and increasing demands for buildings. Students of architecture began to supplement their American training by two or three years of study in Paris and travel in Europe, and an extraordinary activity in building was accompanied by a remarkably rapid awakening and development of the public taste. For 15 years or more the influence of H. H. Richardson (q.v.) was paramount, beginning with his fine Trinity Church in Boston (1876) and was continued by a remarkable series of public, private, and ecclesiastical buildings, designed in a vigorous though highly personal style based on French and Spanish Romanesque precedents. This was succeeded by a growing taste for classic and Renaissance types, greatly stimulated by the enthusiasm awakened by the show palaces of the Columbian Exposition at Chicago in 1893. Rapid progress was made in both the design and construction, as well as the planning of monumental edifices and groups

of buildings, owing both to the improvement of taste in the public and to the increasing numbers of trained architects and draughtsmen, many of them educated in Paris. Building activity became greater in the United States than in any other country, and vast sums were spent yearly on business buildings, palatial residences with superb gardens, libraries, and university groups. The development of the elevator or lift, between 1865 and 1880, made practicable buildings of 8 to 12 stories in place of the old-limit affair of 5; and steel-frame construction, first developed in a practical way in Chicago about 1886–88, and adopted in New York since 1892, made possible the "sky-scraper" of 20 or more stories, represented by the Woolworth building (1912) of 57 stories. Eclecticism has prevailed as to style in late years, the details of Gothic architecture having found great favor for many kinds of buildings, while versions of classic and Renaissance styles, freely handled, rule in the majority of buildings of a monumental character, varied by the occasional employment of Greek forms and details.

**Recent Architecture.** The profound peace enjoyed by the people of western Europe and America in recent years has encouraged extensive building. In Europe the necessary monuments and public buildings have been built according to customary formulas, but in minor works there has been a tendency toward extreme eccentricity. An abandonment of old conventions and the development of new has created the so-called *Art Nouveau* or *Style Nouveau*, which is represented in all the arts, but has had most effect in architecture. So far as the *Style Nouveau* has contented itself with the abandonment of meaningless excrescences and tended to bring architecture back to its fundamental relations of color, line, and form, its work has been beneficial. But it has seldom stopped at this point. It has usually proceeded to the invention of new forms which have little reason for existence and little beauty.

Like most modern art movements, the *Style Nouveau* crystallized in Paris. In France, however, its eccentricities have in general been mitigated and even avoided by the prevailing good taste of the nation. In the Exposition of 1900 at Paris the new spirit was seen in nearly all the architecture, though only a few of the buildings displayed the bizarre and extreme freakishness of the *Pavillon Bleu*. A large part of the current design of apartment houses and hotels in France is in the new spirit, sometimes very happily handled, but often devoid of true architectural dignity and consistency.

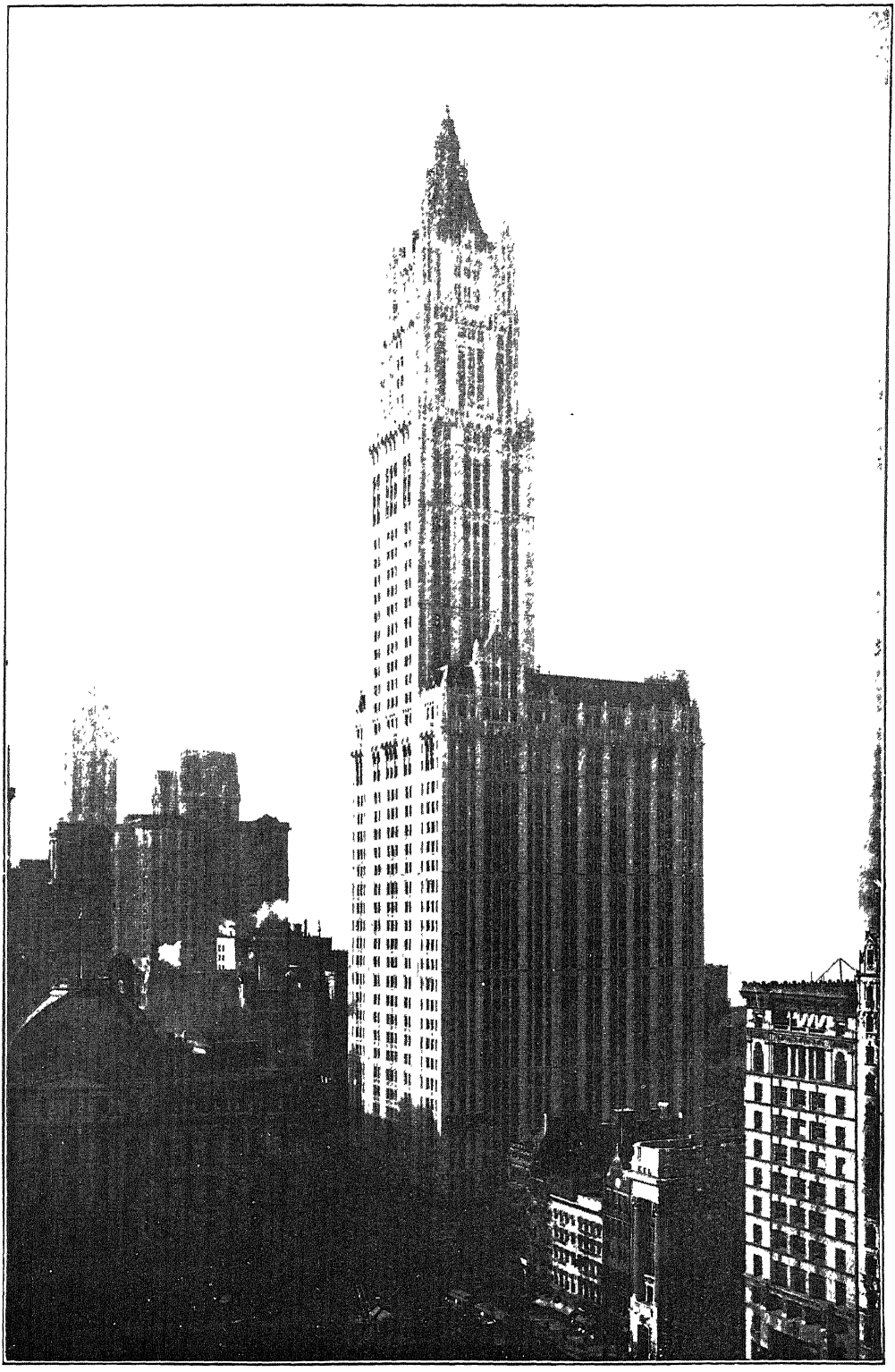
The most extreme development of the *Style Nouveau* may be studied in Germany and Austria. Although the results in the former country are sometimes happy, especially in suburban residences, they frequently violate all laws of structural expression and propriety. In Vienna, an important centre of the movement, there are many examples of modern design controlled by good taste. The application of color to stuccoed exteriors has received much attention in that city. In Bohemia the new art has run to riotous extremes in external design. A good example of a rational style is the City Hall of Copenhagen, by Martin Nyrop. In Holland and the Low Countries generally there has been much interesting work in brick.

In England, where the art of William Morris, one of the forces underlying the *Style Nouveau*, had its home, the less attractive phases of the movement have not found encouragement. Since the Victorian Gothic revival in the middle of the nineteenth century the sympathy of English architects has been with mediæval motives and ideals. Classic conventions have been used solely for secular buildings and then not with interest and often without correctness. Of the Mediæval manner, Romanesque or Gothic, the churches of John Francis Bentley (d.1902) and especially his Roman Catholic Cathedral of Westminster may perhaps be considered the most characteristic. There is also a new cathedral at Liverpool by Gilbert Scott, and a huge building for the London County Council on the bank of the Thames.

Undoubtedly the most powerful later architectural achievements have been in the United States. The rapid advance in individual fortunes and in the general well-being of the people, the invention of new and facile methods of construction, already mentioned, and the consequent necessity of a prodigious amount of building have already been alluded to. In recent years this phenomenal architectural activity has been accompanied by a remarkable awakening of interest in the problems of city planning and municipal embellishment, an awakening not confined to the United States. Indeed, Germany has been for years a leader in this field, and there have been International Congresses of city planning in London, Düsseldorf, and other European cities.

Among American cities, Washington has presented the most promising field for experiments, inasmuch as it is still possible to carry out, in its main features, the original design of De l'Entant for the laying out of that city (1791). In 1902 a commission for formulating plans was appointed; its report was adopted in 1904, and some work has been already executed in pursuance of its recommendations. A commission was appointed to plan the rearrangement of considerable portions of the city of New York, but its remarkable report has never been officially adopted nor any part of it carried into execution. Chicago, Pittsburgh, Cleveland, San Francisco, and many other cities have followed these examples. Among important buildings erected by the Federal government or by States and cities within recent years are the Offices of Congress at Washington, the Custom House, Public Library, and Municipal Offices in New York; State capitols for Minnesota at St. Paul and for Wisconsin at Madison; the very monumental Union Railway Station at Washington; and the New York Central and Pennsylvania terminals at New York, both of colossal dimensions and immense cost.

If libraries and museums be included under the category of *educational architecture*, this division probably constitutes the most important and prolific field of American architecture during recent years. All the great universities and many colleges have made substantial additions to their buildings. Among the most prominent examples of extensive plans now being carried out are those of the National Military Academy at West Point, the Naval Academy at Annapolis, the University of California at Berkeley, and Columbia University in New York City. In ecclesiastical architecture the most notable achievements in recent years have been the completed portions of the cathedral of St. John the Divine, the many-storied Broadway Tabernacle, the superb new St. Thomas's Church, all in New



A MODERN AMERICAN TOWER BUILDING

THE WOOLWORTH BUILDING, NEW YORK CITY

York City, St. Paul's Church in Chicago, and extensive cathedral projects for Baltimore and Washington.

In *commercial architecture* the bank buildings have generally been the most elegant and pleasing, partly because of their moderate height and simple and massive construction. Among the prominent examples of "sky-scrapers" are the tower-like Singer, Metropolitan Life, and Woolworth buildings in New York, the latter 792 feet 1 inch in height above sidewalk.

In this brief survey there has been no place for the architecture of Farther Asia, of India, and the neighboring provinces; of China and Japan; still less for the architecture of Mexico, Central America, Peru, etc. All these are described under their especial heads, and under ARCHITECTURE, ANCIENT AMERICAN. The details of all the styles here mentioned are also given under the subdivision *Architecture* of such separate titles as ASSYRIAN ART; BABYLONIAN ART; BAROCCO; BYZANTINE ART; CHRISTIAN ART; EGYPTIAN ART; GOTHIC ART, GREEK ART; MOHAMMEDAN ART; PERSIAN ART; PHŒNICIAN ART; RENAISSANCE ART; ROMAN ART; ROMANESQUE ART. Under the general head ART, HISTORY OF, a review is given of all the various classes of titles under which the architectural material in this encyclopædia is classified, such as biographies of architects, descriptions of various kinds of buildings, definitions of terms, etc. The history of the science and material of construction is given under BUILDING.

**Bibliography.** An excellent introduction to the principles and appreciation of architecture is by Sturgis, *How to Judge Architecture* (New York, 1903), and of more popular character, Wallis, *How to Know Architecture* (New York, 1910). A systematic handbook of styles is Rosengarten, *A Handbook of Architectural Styles* (Eng. trans., London, 1878). More recent, and with references and a larger enumeration of monuments, is Hamlin, *A Textbook of the History of Architecture* (New York, 1909). Fergusson, *A History of Architecture in All Countries* (London, 1893; American revision, New York, 1905), has value, but is out of date; a recent, reliable, and scholarly work is Simpson, *A History of Architectural Development* (London, 1912). Two volumes have appeared of the three required to complete Sturgis's *History of Architecture* (New York, 1905—). Fletcher and Fletcher, *A History of Architecture* (London, 1905) follows the comparative method. Another compact one-volume history is by Stratham, *History of Architecture* (London, 1912). Lübke, *Geschichte der Architektur* (Leipzig, 1884), is somewhat antiquated, but generally accurate. Ramée, *Histoire de l'architecture* (Paris, 1885), is still useful. A critical history, from the standpoint of pure construction and form, has now been given in Choisy, *Histoire de l'architecture* (Paris, 1899), without an enumeration of monuments, and extremely technical. Two series of separate handbooks, each covering some special style or country, and together forming a complete whole, are being published—one in France, the other in Germany. The general title of the French series is *Bibliothèque de l'enseignement des beaux-arts* (see ART, HISTORY OF): Laloux, *L'architecture grecque* (Paris, 1888); Corroyer, *L'architecture romaine* (Paris, 1887), and *L'architecture gothique* (Paris, 1891); and Palustre, *L'architecture de la Renaissance* (Paris, 1892), are the only volumes on architecture alone; but the rest of the field is covered in the architectural sections of the following general volumes: Maspero, *Egyptian Archæology* (London, 1895); Babelon, *Oriental Antiquities*, translated by B. T. Evetts (New York, 1889); Martha, *L'archéologie étrusque et romaine* (Paris, 1884); Peraté, *L'archéologie chrétienne* (Paris, 1892); Bayet, *L'art byzantin* (Paris, 1883); Gayet, *L'art arabe* (Paris, 1893), and *L'art persan* (Paris, 1895).

The German series is more detailed and is solely architectural. It is the *Handbuch der Architektur*, ed. Durm (Darmstadt, 1895; now issued from Stuttgart), and contains special volumes on the theory and practice of architecture as well as its history. Its four sections are entitled: I. *Allgemeine Hochbaukunde* (materials; statics; methods; forms); II. *Baustile* (history, in four sections: Ancient, Mediæval, Renaissance, and Modern); III. *Hochbau-Constructionen* (elements of structure; foundations; external features; internal features; specific details); IV. *Entwerfen, Anlage und Einrichtung der Gebaude* (composition; buildings for dwelling and trade; buildings for agricultural and provisioning purposes; public houses, clubs, halls, etc.; buildings for health, charity, etc.; educational, scientific, and artistic establishments; civic, governmental, administrative, and military buildings; religious and memorial structures; the city). There are a number of octavo volumes in each of these sections and subsections, several of which have been published. In the historical section the most valuable are: Durm, *Die Baukunst der Griechen* (Darmstadt, 1892), and *Die Baukunst der Etrusker und der Römer* (Darmstadt, 1885). Others are: Essenwein, *Die Ausgange der classischen Baukunst* (Early Christian), and *Die Fortsetzung der classischen Baukunst im oströmischen Reiche* (Byzantine); Franz Pascha, *Baukunst des Islam* (Darmstadt, 1896); and Essenwein, a series of works on *Die romanische und die gothische Baukunst* (Darmstadt, 1889–92), including his volumes on *Military Architecture* (*Kriegsbaukunst*), and *Domestic Architecture* (*Wohnbau*); also Halak, *Der Kirchenbau* and *Einzelheiten des Kirchenbaues*.

There are two principal dictionaries of architecture in English; *The Dictionary of Architecture* of the English Architectural Publication Society, on a large scale, never completed; and Russell Sturgis, *Dictionary of Architecture* (3 vols., New York, 1901–02). Gwilt, *Encyclopædia of Architecture* (London, 1888), is handy to consult. In French there is Planat, *Encyclopédie de l'architecture et de la construction* (Paris, 1890–93). An excellent modern architectural manual is Guadet, *Eléments et théorie de l'architecture* (4 vols., Paris, 1902). The bibliographies for particular phases and periods of architecture will be found under the various articles treating of them.

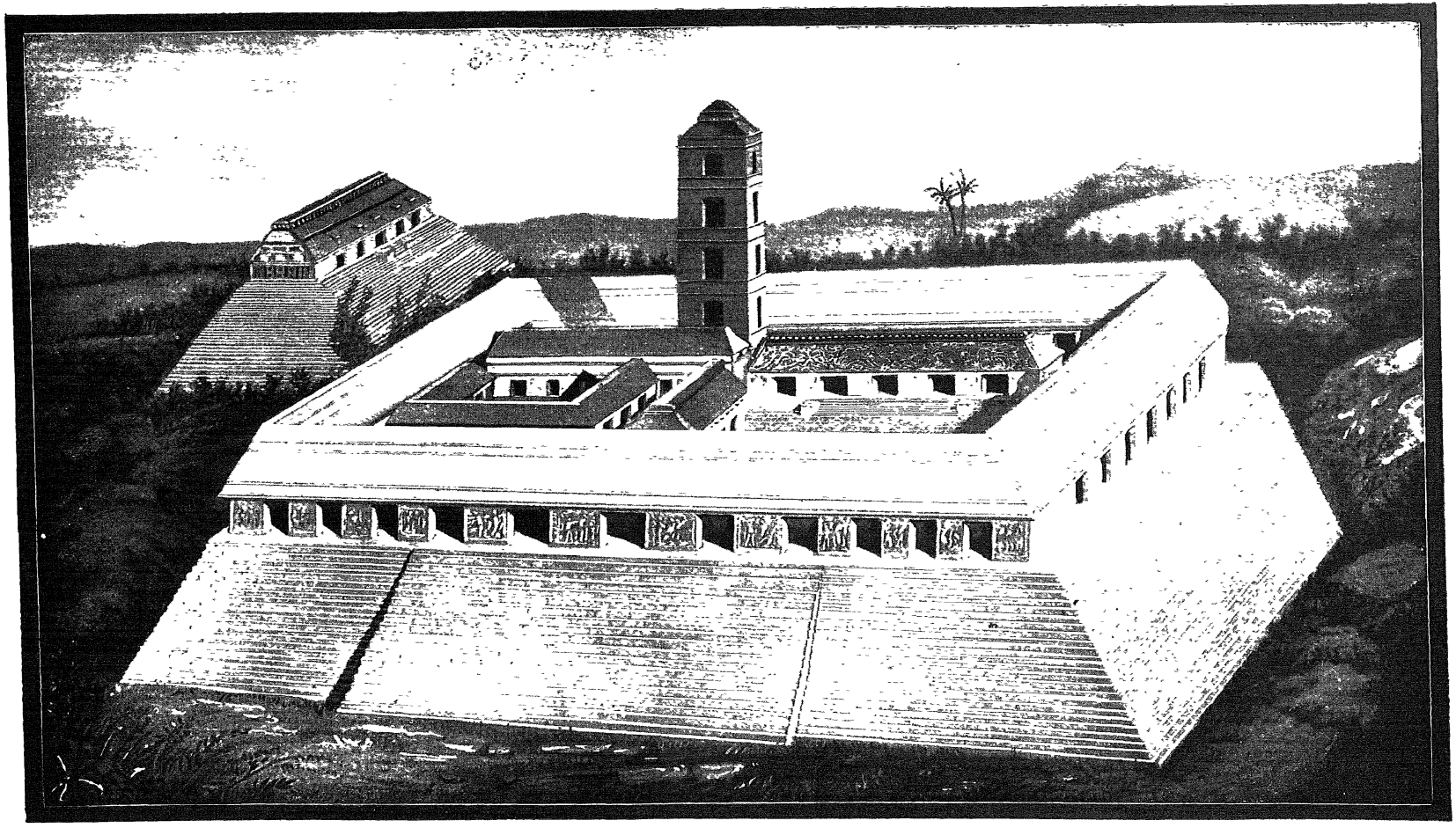
**ARCHITECTURE, APPRECIATION OF.** Since architecture is an art which touches life at many points and concerns both the public and the individual in many important relations; since, moreover, good architecture can flourish only where there prevails an enlightened public taste, and the public taste is but the sum of the individual tastes of the community, it is important that every citizen should be capable of a correct appreciation of architectural works, i.e., qualified to pass intelligent judgments upon the

merits and defects of the buildings he sees, based not upon caprice or mere personal likes and dislikes, but upon knowledge and good taste. A person wholly ignorant of architecture may like or dislike particular buildings, but his appreciations are valueless. The general standard of architectural taste is determined by the number and culture of those who, without professional training, know enough of the principles and of the great masterpieces of the art to discriminate between the good and the bad. For the attainment of this knowledge and of the good taste which should control its use, the chief means are reading, travel, and the study of plans, photographs, and other illustrations of architecture. Fortunately the abundance of books, periodicals, and illustrations available in public and private libraries makes possible a fairly broad knowledge of architecture, even for persons of moderate means and those unable to travel and see in person the great masterpieces of the art abroad.

Architecture is not, as too many seem to think, an art merely of the external dress of buildings, still less, as Ruskin's writings apparently imply, a matter wholly or chiefly of ornamental detail. It is, first of all, an art of *building;* it is based on construction and planning, upon which the decorative treatment, both internal and external, is really dependent. A true work of architecture is the material realization of an artistic conception, of which the planning, construction, composition, and decoration are, so to speak, the four corner stones. In the plans the architect seeks to meet utilitarian requirements by the arrangement of rooms and "circulations" (corridors, etc.); structural requirements by the disposition of the walls, supports, piers, etc.; and æsthetic requirements by the proportioning of all the parts. Planning is thus the foundation of architectural design, construction, its means of realization; composition determines the main lines and masses of its visible aspect, and decoration dresses the whole in pleasing details. Good planning, sound and rational construction, pleasing masses and proportions, harmonious, appropriate, and refined detail and ornament, and a general expressive effect suitable to the purpose, function, size, materials, and constructive system of the building, are all found in good architectural works. The historic styles are the methods of design and combinations of form evolved in different ages and lands, and the study of these constitutes the study of the history of architecture; but *style,* as a quality, is character independent of any particular historic expression. All the above considerations are involved in the appreciation of architecture. Consult: Sturgis, *How to Judge Architecture* (New York, 1903); Statham, *Architecture for General Readers* (New York, 1895); Wallis, *How to Judge Architecture* (New York, 1911); Guadet, *Théorie de l'Architecture* (Paris, 1902); Hamlin, *A History of Architecture* (New York, 1909); Fletcher, *A Comparative History of Architecture* (London, 1905); T. G. Jackson, *Reason in Architecture* (London, 1906); Van Pelt, *A Discussion of Composition, especially as applied to Architecture* (New York and London, 1902). See ARCHITECTURE; DECORATIVE ART.

**ARCHITECTURE,** ANCIENT AMERICAN. No historical sketch of aboriginal American architecture is possible with our lack of reliable data as to the history of the American races and their relation to each other. The tribes whom we are accustomed to group under such heads as "Mound Builders" and "Cliff Dwellers" (for illustration see these titles), although far from being the earliest inhabitants of our continent, never produced any works that enter the domain of art, though some of the "pueblos" show careful construction and plan, especially in Arizona and New Mexico; for example, Casa Grande (q.v. for illustration), Chihuahua, and Bonito. The peoples of Maya and Nahuatl nationality who founded the confederacies of Mexico, Central America, Peru, and other South American states, developed an architecture that may fairly be compared with that of Farther Asia, especially India. But no sure historic records of the age of these monuments give an earlier date than the twelfth century A.D.; though plausible conjecture goes back to the fifth century B.C. for the earliest Maya examples. The earliest ruins are those of the Mayas, and among them we can distinguish local variations and historic development; for example, those of Chiapas, of which the most important are at Palenque, differ from those in Yucatan, which are much later. The ruins at Copan, in Honduras, form the connecting link between the Palenque style and that found at Uxmal, Chichen-Itza, Izamal, and other ruined cities of Yucatan. Guatemala also has monuments of the Palenque, and later types, at Utatlan, Cahuinal, Tikal, etc. The fortified city of Tenampua, in Honduras, is especially interesting. The Maya ruins of Central America are the more monumental the nearer they approach the frontier of Yucatan. The arrangement of the buildings is according to one general scheme: they rise from a mound, surmounted by a platform on which the building or buildings stand. This mound is entirely or partly natural, cut into terraces about 5 feet high or lines of stone steps. The lines of the mound are made by rubble and retaining walls faced either with colored stucco or large slabs (Palenque) or with dressed stone (Chichen-Itza and Uxmal). The separate buildings rise from a base in the form of a truncated pyramid, and the chambers and passages are covered with vaults formed of the triangular corbel arch of projecting horizontal courses. Among the most impressive structures are the pyramids; one at Izamal is between 700 and 800 feet long and contains several chambers. They usually rose in front of each temple. These pyramids were crowned by shrines and bear some resemblance to Buddhist buildings in India. The greatest variety of monuments is at Chichen-Itza. There was a lavish use of decorative sculpture either as integral part of the architecture, or in the form of accessory steles, pillars, obelisks, statues. The famous "Tablet of the Cross" from Palenque is the most tasteful simple piece. An idea of the way in which the Maya buildings were grouped is given by the ruins of Palenque, Umaland, and Chichen-Itza. For illustrations, see these titles.

The Mayas suffered from invasions of Nahuatl peoples in the sixth century A.D., but though more recent, the Nahuatl monuments appear not to have survived so well; perhaps because this people preferred the less durable material of adobes, cemented together with mortar, to the stonework of the Mayas. This is exemplified in the Pyramid of Cholula, originally crowned by a magnificent temple destroyed by Cortés. It measures 1440 feet square—an area nearly four



MEXICAN ARCHITECTURE

THE TEMPLE OF PALENQUE—RESTORATION

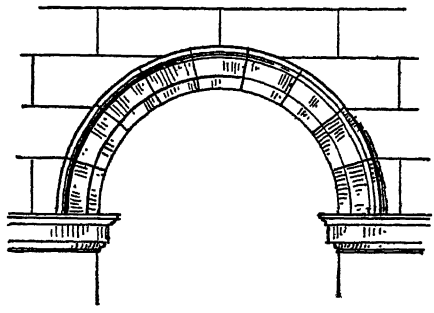
times that of the Pyramid of Cheops; its height was 177 feet, and it was divided into four terraces. Ruins of debated character occur at Xochicalco, in Mexico, Huatusco, and Centla. Here, as with the Mayas, the truncated pyramid is the main form of substructure. It is curious that even less remains of the Aztec monuments, erected only during the two centuries preceding the Spanish Conquest. Probably it was because, being the centres of civilization at that time, they bore the brunt of Spanish vandalism, while the older cities, long since deserted, remained immune and often unknown. Perhaps slightly earlier than the Aztec domination are the cities of the Zapotecs in Central America, whose capital, Mitla, was captured and ruined by Aztecs c.1500 A.D. The palace at Mitla has called forth the most enthusiastic praise for the beauty of its masonry, the symmetry of its proportions, and the classic restraint of its ornament. This palace consists of an interior quadrangle, 130 × 120 feet, surrounded on three sides by mounds crowned by other buildings. It is built not entirely of dressed stones, as at Palenque, but of faced rubble, as in Yucatan. The main hall was supported by six columns, supporting heavy beams, a most unusual arrangement. It must be remembered that the manual labor of facing the masonry and executing the sculptured decoration in all these buildings of Central America and Yucatan was vastly increased by the lack of metal implements. We finally come to Peru, which is studded with ruins of the greatest interest, bold in construction and massiveness, though lacking in that richness of sculptured ornament so characteristic of the styles thus far mentioned. Pachacamac, Chimu, Tiaguanaco, Titicaca, and Cuzco are the most important sites. The fortresses are of especial interest; also great engineering works, such as aqueducts, reservoirs, and bridges. The temples, called *huacas*, are composed of truncated pyramids, usually of stone. That of Obispo is 150 feet high, with a base 580 feet square, covering eight acres. Some of these pyramids served as sepulchres, like one near Obispo, surrounded by an inclosing wall 14 feet high. Another at Moche was 800 × 470 feet and about 200 feet high. The palaces were built of adobes and were formed of an irregular series of buildings on a terraced mound. That at Chimu is typical. The ruins at Tiaguanaco are, perhaps, the earliest and belong to a civilization prior to that of the Incas. Most remarkable are the numerous erect monoliths comparable to the Celtic monoliths in the Mediterranean (e.g., Malta), and in England (e.g., Stonehenge). For books of reference, consult the bibliography under ARCHÆOLOGY, AMERICAN.

**ARCHITRAVE**, är'kĭ-trāv (Gk. *ἀρχι-*, *archi-*, chief + Lat. *trabs*, beam). The lowest member of the entablature (q.v.), which rests immediately upon the columns, also called the epistyle. The term also designates the lintel over a square-headed window or doorway. It is even sometimes applied to the molded bands carried around the top and sides of a window or door. For illustration, see ENTABLATURE.

**ARCHIVES**, är'kīvz. See RECORDS, PUBLIC.

**ARCHIVES**, HOTEL DES. The name signifies the equivalent of Hall of Records, but although general in its meaning and applicable to any French building for storing official records, it is applied as a special name, by preëminence, to an important seventeenth to eighteenth century building in Paris in which is stored a priceless collection of historic records and original manuscripts of treaties and decrees from the time of Dagobert to that of Napoleon. The building, sometimes known as the Hôtel Soubise from the family to whom it formerly belonged, is a stately example of the richest private architecture of the time of Louis XIV, with a magnificent entrance court, of which the simple but dignified house façade forms the rear elevation. It was remodeled in part and decorated in the eighteenth century; particularly rich is the oval chamber with paintings by Boucher, and the "Salle des Bourbons," both in the style of Louis XV. The collections are open to the public on certain days.

**ARCHIVOLT**, är'kĭ-vōlt (It. *archivolto*, from *archi*, chief + *volto*, vault, arch). A molded or otherwise decorated band or series of bands around the opening of an arch. In the classic styles the bands and moldings project from the general plane of the wall, the outer molding most of all. In mediæval architecture the moldings are cut into the voussoirs and recede successively inward from the plane of the wall as they approach the soffit, or intrados. The term "archivolt" is, however, rarely used of these



ARCHIVOLT.

mediæval moldings. In good design the moldings of the archivolt are confined to the voussoirs, and define correctly the intrados and extrados of the arch. Archivolts are sometimes used, with purely decorative intent, even where the extrados of the arch is stepped. In the Baroque style (q.v.), and in some modern work, an interrupted archivolt is used in combination with rusticated voussoirs—a doubtful device, though picturesque. Archivolts may be merely painted, in interior decoration; and they may be flat bands of marble or glazed tile, as in Assyrian buildings. See DRIPSTONE.

**ARCHLUTE**, ärch'lūt' (It. *archiliuto*). A large double-necked lute about 4 feet 5 inches long, used in the seventeenth century for the lowest part in instrumental music and accompaniments. The neck contained two sets of tuning pegs, the strings were of catgut or metal, and the compass was two octaves, from C below the bass clef. The sound board, with a circular hole, was of pine, while the back was made of strips of pine and cedar glued together and richly ornamented. See LUTE; THEORBO.

**ARCH OF ARCA'DIUS, HONO'RIUS, AND THE'ODO'SIUS.** See THEODOSIUS, ARCH OF.

**ARCH OF AUGUS'TUS.** See AUGUSTUS, ARCH OF.

**ARCH OF CLAU'DIUS.** See CLAUDIUS, ARCH OF.

**ARCH OF CON'STANTINE.** See CONSTANTINE, ARCH OF.

**ARCH OF DRU'SUS.** See DRUSUS, ARCH OF.

**ARCH OF HA'DRIAN.** See HADRIAN, ARCH OF.

**ARCH OF JA'NUS QUAD'RIFRONS.** See JANUS QUADRIFRONS, ARCH OF.

**ARCH OF SEPTIM'IUS SEVE'RUS.** See SEPTIMIUS SEVERUS, ARCH OF.

**ARCH OF TI'TUS.** See TITUS, ARCH OF.

**ARCH OF TRA'JAN.** See TRAJAN, ARCH OF.

**ARCHON,** är'kŏn (Gk. *ἄρχων, archōn*, literally leader, chief, from *ἄρχειν, archein*, to begin, lead, rule). A generic title for the highest magistrate, the actual ruler, in Athens, and other Greek cities. The Athenian archon is the only one whose history and duties are well known. There were nine archons at Athens, chosen yearly by lot. The first was called "The Archon," or, since he gave his name to the year, Archon Eponymos, the 'Namesake Archon'; the second was the Archon Basileus, the third Archon Polemarchus; the other six were Thesmothetæ. During the Athenian democracy the archons were law officers, the Archon Eponymos having charge of suits relating to the family, the Basileus of religious cases, the Polemarch of those involving foreigners, and the Thesmothetæ of a variety of other cases. According to Athenian tradition the last king, Codrus (q.v.), was succeeded by a life archon; in 752 B.C. the office was limited to 10 years. Up to this time, only members of a certain family could be archons; but in 713 B.C. the office was opened to all nobles (Eupatridæ), and in 683 B.C. it was made annual. Finally, in 457 B.C., it was opened by law to citizens of the three upper classes and in practice to all citizens. The historical development seems rather to have been the reduction of the power of the Basileus, by giving first the military command to a new officer, Polemarch ('general'), and then by adding a civil ruler as the civil head of the state, thus restricting the 'king' to religious functions. The military command was still held by the Polemarch at the time of the battle of Marathon (490 B.C.); that battle was fought by Miltiades (q.v.), as Polemarch. The same Greek word is often used to denote rulers who, strictly, bore other official titles.

Among the Jews of the Dispersion the title "archon" was used to denote members of the official body exercising control over their independently organized communities, as at Alexandria, Antioch, and Rome. In the New Testament it is used specifically of members of the Sanhedrin (e.g., Nicodemus, John iii. 1), of the officer presiding over the synagogue (e.g., Jaïrus, Luke viii. 4); and, generally, for rulers, magistrates, and men of influence. In the sense of ruler it is applied to Christ in Rev. i. 5: "Ruler [archon] of the kings of the earth," and to Satan in John xii. 31: "The prince [archon] of this world." In the mystical jargon of the Gnostics the term "archon" was frequently employed; hence one of their sects, especially opposed to Judaism, received the name "Archontics." See GNOSTICS; HERESY; HERETICS.

**ARCH-PRIEST,** ärch'prēst'. A name dating from the fourth century and equivalent to the Greek *prōtopresbyter*. It was usually applied to a senior priest attached to a cathedral, whose duties were to assist the bishop, to act as his substitute in the performance of the church offices, and to have general oversight of the cathedral clergy; also to those placed in large towns to occupy similar positions respecting the local clergy. This title in later times gave way to that of *dean*, as applied to the former, and *rural dean*, to the latter class of arch-priests.

**ARCH'WAY** (*arch* + *way*). A vaulted passage between walls; or any passage, vaulted or not, terminating in an arched opening at each end.

**ARCHYTAS,** är-kī'tas (Gk. *Ἀρχύτας*). The son of Mnesagoras, or Hestiæus, of Tarentum, a distinguished philosopher, mathematician, general, and statesman. He lived in the first half of the fourth century B.C. and was thus a contemporary of Plato, whose life he is said to have saved by his influence with the tyrant Dionysius. He was seven times elected general of his city, though it was customary for the office to be held for one year only; he was never defeated. His connection with Plato belongs to the time of the latter's visit to lower Italy. He was drowned on the Apulian coast and is said to have been buried near Matinum, in Apulia. Archytas was a man marked for his morality, self-control, and gentleness. As a philosopher, he belonged to the Pythagorean school. His services to the science of mathematics were many and important, and he passed as the founder of scientific mechanics. He was the first to distinguish harmonical progression from arithmetical and geometrical progression; he also solved the problem of doubling the cube. (See CUBE.) Among his mechanical contrivances was a flying pigeon made of wood. He is said to have invented the pulley. As an astronomer, he taught that the earth is a sphere rotating on its axis once in 24 hours and that the heavenly bodies move about it. He further made original contributions to the knowledge of musical tones. In philosophy he must have influenced Plato not a little, and perhaps, also, Aristotle. The mathematical fragments of Archytas have been carefully collected by Blass in *Mélanges Graux* (Paris, 1884). The other fragments which are attached to the name of Archytas, and which relate to ethics, logic, and physics, are probably for the most part not genuine. They are to be found in Mullach, *Philosophorum Græcorum Fragmenta*, vol. i (Paris, 1860–81). The two letters ascribed to Archytas, one addressed to Dionysius and the other to Plato, and the work *On the Ten Categories*, are also spurious.

**ARCHYTAS** OF AMPHISSA (c.240 B.C.). A Greek poet, to whom some hexameter lines are attributed by Plutarch, Athenæus, and Stobæus. He is spoken of by Diogenes Laërtius as an epigrammatist upon whom Bion wrote an epigram. Nothing is known of the details of his life and work beyond the scanty information given by the authors named.

**ARCIF'ERA** (Lat. *arcus*, bow + *ferre*, to bear, carry). A group of anurous amphibians, the toads, having a tongue, with the clavicle and coracoid of each side connected by a longitudinal arched cartilage, allowing contraction and expansion. See TOAD.

**ARCIS-SUR-AUBE,** är'sēs' sụr ōb' (Fr. Arcis on the Aube). Capital of the arrondissement of the same name in the French department of the Aube, and remarkable on account of the battle fought here, March 20–21, 1814, between Napoleon and the allied forces under Prince Schwartzenberg (Map: France, N., K 4). The battle began with several skirmishes on the first,

and ended in a general engagement on the second day, when the French retreated over the Aube. It was sanguine but indecisive. After the battle Napoleon determined to operate in the rear of the allies, and left the road to Paris open, assuming that they would not venture to proceed without attempting to secure their rear. The allies marched, nevertheless, on the capital, and thus decided the campaign. Arcis-sur-Aube is the birthplace of Danton. Its industries are silk and cotton spinning, stocking weaving, and it has an important trade in grain. Pop., 1901, 2774; 1911, 3033.

**AR'CITE.** One of the two Theban knights who, in Chaucer's *Knight's Tale*, are at first close friends, but who, having seen the lovely sister-in-law of Theseus from their prison window, both claim her as mistress and later joust fiercely for her hand, in which tourney Arcite is slain.

**ARC LAMPS AND ARC LIGHTING.** See ELECTRIC LIGHTING, *Arc Lamps*.

**ARCO DEI LEONI,** dā'ē lā-ō'nē (It. Arch of the Lions). A gate in Verona, built supposedly in the third century A.D. Originally it had two arches, but at present only one remains. It is a dainty bit of architecture, with Corinthian columns, above which is a story pierced with three openings between pilasters. It is situated in the Via Leoni and is coeval with the Porta de' Borsari.

**ARCO DELLA PACE,** dĕl'lä pä'chā (It. Arch of the Peace). A large arch of white marble, with smaller ones on either side, surmounted by a bronze figure of Peace driving a six-horse chariot. It was erected in Milan, Italy, in 1807, in honor of Napoleon, but not completed until 1838, and was consecrated to Peace in 1815.

**ARCOLE,** är'kō-lā. An Italian village in the province of Verona, situated on the left bank of the Alpone and famous for the victory gained by Bonaparte over the Austrians under the chief command of Alvinczy, Nov. 17, 1796. From the 14th to the 16th the French vainly attempted to rush the bridge across the Alpone held by the Austrians under Mittrowsky; on the 17th they forded the stream below the bridge and took the enemy in the rear. In the series of battles around Arcole the Austrians lost 18,000 men, and, as a result of the battle, they were compelled to abandon the relief of Mantua, which was besieged by the French.

**ARÇON,** är'sōN', JEAN CLAUDE ELÉONORE LE MICHAUD, LEMICEAUD, D' (1733–1800). A distinguished French engineer. He was born at Pontarlier, and was educated as an engineer in the military school at Mézières. During the Seven Years' War he acquired considerable reputation, especially in the defense of Cassel, his work being distinguished by a remarkable fertility of invention. His most famous scheme was a system of floating batteries designed to reduce Gibraltar (1780), then in the hands of the English and defended by Governor Elliot. The attempt, however, was not successful, mainly because of the fact that his efforts were indifferently supported. When the French under Dumouriez overran Holland, Arçon took several strongly fortified places, among others, Breda. After his retirement from the army he was called to the Senate (1799). His important work is *Considérations militaires et politiques sur les fortifications* (Paris, 1795).

**ARCO'NA.** See ARKONA.

**ARCOS DE LA FRONTERA,** är'kōs dā lä frōn-tā'rä (Sp. Bow of the Frontier, alluding to its being built in bow shape and to its position on the frontier). A town on the right bank of the Guadalete, in the province of Cadiz, Spain (Map: Spain, C 4). It is situated on a conical height 545 feet above sea level, and is a remarkably picturesque city with steep, crooked streets. Above the city stands the castle of the dukes of Arcos, now in ruins. Beyond are the Ronda Mountains. Seven monasteries, two parish churches, with the main church of Gothic style, are among its interesting buildings. The manufactures include leather, mats, thread, and rope. There is considerable trade in oil, wine, and fruit. Pop., 1900, 14,393; 1910, 13,983.

Arcos is the Arcobriga (Celt. *briga*, town) of the Romans. It was wrested from the Moors by Alfonso the Wise, and strongly fortified as a frontier town, in 1264.

**AR'COSO'LIUM** (Lat. *arcus*, arch + *solium*, seat, chair of state). A name given to the niches, surmounted by an arch, that were used, for example, in the early Christian catacombs, for the burial of the more illustrious dead. They usually contained a carved marble sarcophagus and were ornamented with frescoes.

**ARCOT,** är-kŏt' (Tamil *Arkat*, Six Woods). A city in the presidency of Madras, India, the capital of the district of North Arcot, on the right bank of the Palar River, 65 miles west of Madras (Map: India, C 6). It is a railway junction, has a military cantonment, contains some mosques in a tolerable state of repair, and the ruins of the Nawab's palace. Of great antiquity and mentioned by Ptolemy, it is noteworthy because of its history, the most brilliant incident of which was its capture and defense by Clive (q.v.), in 1751. It was acquired by the East India Company in 1801. The walls of the famous fort now serve as a dyke which protects the city against periodical inundation. Pop., 1901, 10,734; 1911, 11,475.

**ARC'TIC** (Gk. *ἀρκτικός, arktikos*, northern, from Gk. *ἄρκτος, arktos*, bear, north). A term meaning 'lying near the constellation of the Bear.' The Arctic Circle is a circle drawn round the North Pole, at a distance from it equal to the obliquity of the ecliptic, or 23½°. The corresponding circle round the South Pole is the Antarctic Circle. Within each of these circles there is a period of the year when the sun does not set, and another when it is never seen, this period increasing as we approach the pole itself. At the pole it is six months in length, if we neglect the effects of refraction (q.v.).

**ARCTIC CUR'RENT, HIGH'LANDS.** See ARCTIC REGION.

**ARCTIC DISCOV'ERY.** See POLAR RESEARCH.

**ARCTIC O'CEAN.** See ARCTIC REGION.

**ARCTIC PLANTS.** See ARCTIC REGION.

**ARCTIC RE'GION.** Mathematically speaking, that portion of the surface of our globe which surrounds the North Pole within the limits of the Arctic Circle, and thus, extending 23½° in every direction from the pole, covers an area of 8,200,000 square miles.

Geographically, it is preferable to define the Arctic region as that portion of the northern hemisphere which is subjected to Arctic influences. These influences may be considered, on land, to extend southward as far as the northern limit of tree growth. Within this limit the Arctic region includes, in the western hemi-

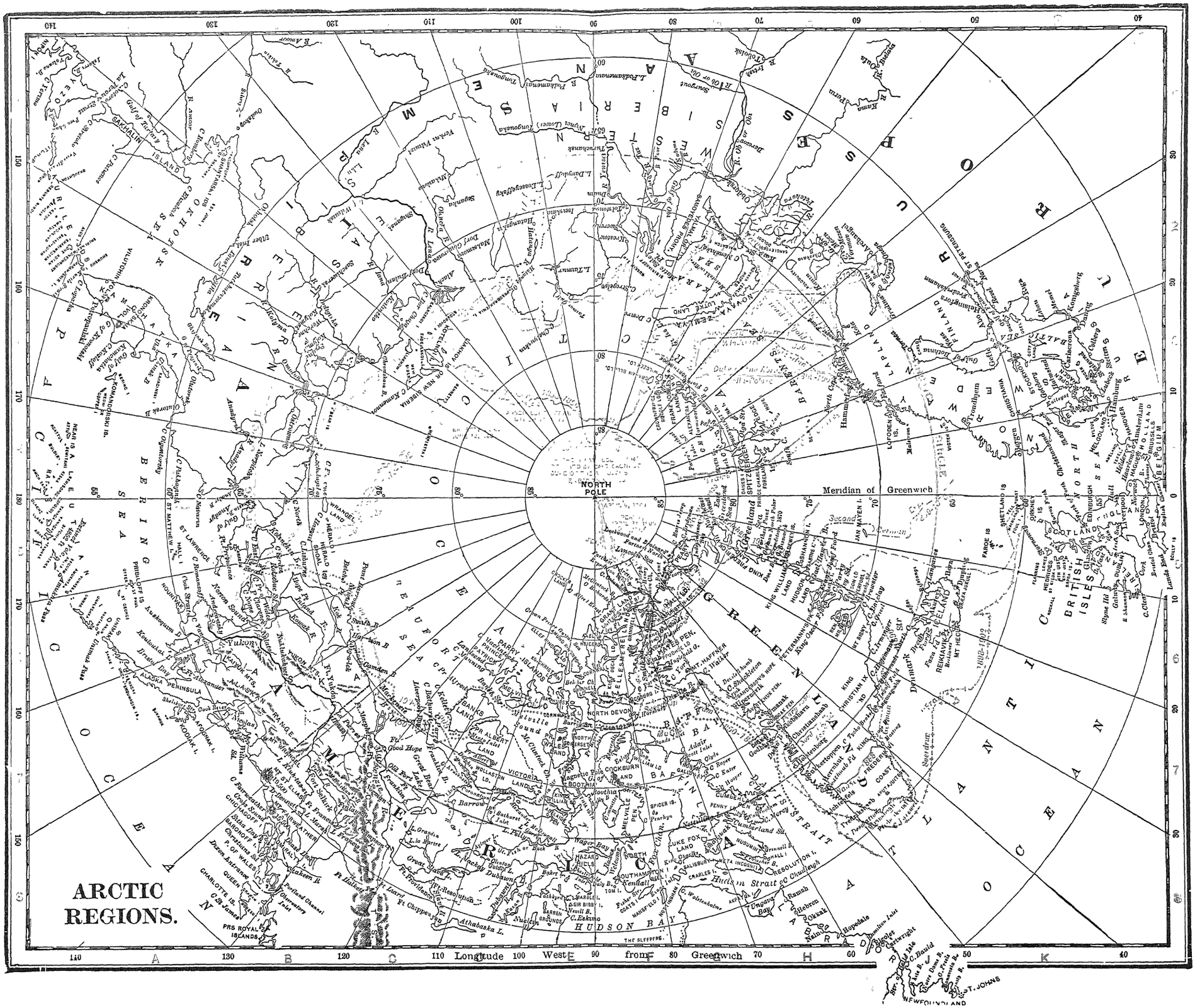
sphere, the western and northern coasts of Alaska, that part of the mainland of Canada north of a line connecting the mouth of the Mackenzie with Fort Churchill on Hudson's Bay (59° N.), the northern part and the eastern coast of the peninsula of Labrador, the whole of the American Arctic Archipelago, and of Greenland. In the Eastern Hemisphere the Arctic region includes the whole northern fringe of the Eurasian coast from the Kola Peninsula, in 35° E. long. to the Chukchee Peninsula, the easternmost tip of Siberia, together with the outlying islands or island groups to the north of Europe and Asia. In September, 1913, the Russian naval officer, Captain Wilkitzky, discovered the east coast of a new land extending from 30 miles north of Cape Chelyuskin, the most northern part of Asia, for 200 miles northwest to lat. 78° N., long. 86° E. He named it Nicholas II Land. It is probably a large island. The lack of strict dependence of climate on latitude is perhaps nowhere better illustrated, for the Arctic region, as thus defined, extends as far south as 51° 30′ N.—the latitude of London—along the Labrador coast, which is inhabited by the Eskimo in his native environment, while in northern Europe it is pushed back to beyond 71° N., where lies the northernmost city of the world, Hammerfest, Norway.

The Arctic is a region of snow and ice; for months in the winter the sun is below the horizon, and though for other months in summer it never sets, its heat is not strong enough in most quarters to reduce the quantity of snow and ice which form in the cold season. The longest day and the longest night at latitude 70° are about two months each; 10° farther north they are about three months each; at the pole they divide the year almost equally.

**Topography.** The land surface of the Arctic region has been as yet but incompletely explored, although the unremitting interest in Arctic exploration is gradually adding to our knowledge of its extent and details. The loftiest region is Greenland, along the east and west coasts of which there are mountains rising from 3000 to 8000 feet above sea level, culminating possibly in Petermann Peak, with an estimated altitude of 8000 to 11,000 feet. The name "Arctic Highlands" was given to that portion of the American continent which lies between Hudson's Bay and the mouth of the Mackenzie River, reaching far below the Arctic Circle. The district lies partly within and partly without the barren or treeless stretches of northern North America. The southern portion has elevations of 1700 to 2000 feet above sea level. The portion north of Great Slave, Great Bear, and Athabasca lakes has a gentle and regular slope toward the Arctic Ocean. The usage of the term "Arctic Highlands" may, perhaps, be extended so as to include the highlands west of Smith Sound. The name was also applied by Ross in 1818 to the region around Cape York (lat. 76° to 78°, long. 67° W.), in Greenland; and the most northern Eskimos, who live on the seacoast at the foot of these mountains, have until recently borne the name of "Arctic Highlanders," given to them by Ross. The northern part of Seward Peninsula in Alaska is characterized also by a broken topography, with mountains rising 5000 feet or more above sea level. Banks Land and other large islands off the coast of the North American continent, including Baffin, Ellesmere, Grinnell, and Grant Lands, are comparatively low, with rounded mountains in the interior. In Baffin Land the central plateau is from 600 feet to 800 feet above the sea, and isolated mountains attain a height of 2000 feet. In the eastern part of Siberia the surface is broken by low mountain ranges and by wide river valleys. The portion of Siberia lying west of the Yenisei River, however, is a low, almost unbroken plain, having a dense growth of moss and containing numerous and extensive swamps, features that are comprehended under the general term of *tundra* (q.v.). Portions of Franz-Josef Land, including Rudolf Island (lat. 80° to 83°) are elevated, the mountains and plateaus rising 2000 feet or more above the sea. Upon these plateaus and that of Spitzbergen, and particularly upon that of Greenland, extensive "ice caps" have formed. The outer edges of these masses of ice are forced through the fiords in the form of glaciers, which discharge icebergs. See GLACIER; GEOLOGY.

**Geology.** The geology of the Arctic lands presents a great variety of features, which, however, are comparable in general to those exhibited in more southern latitudes. Extensive coal beds and numerous fossil remains in sedimentary strata bear evidence that the conditions prevailing in former ages were favorable for the development of a diversified fauna and flora, such as do not at present exist. The Carboniferous strata are the most significant as to the past climatic conditions. They have been found in Banks Land, North Devon, and Spitzbergen. Coal beds and strata of the Tertiary Age have been discovered in Greenland and Grinnell Land, and similar deposits are known to occur as far north as 82°, in which poplar, pine, birch, and hazel flora are represented. In Spitzbergen a Carboniferous flora has been obtained, comprising no less than 26 species, of which some are new, but others common to the coal measures of England and the United States. Greenland (q.v.) consists principally of gneisses, schists, and granite, with later intrusions of basalt, and is noteworthy as the source of the mineral cryolite. Most of the islands off the North American Continent are made up of crystalline rocks and Paleozoic sediments, of probably Cambrian and Silurian Age. The northern part of Seward Peninsula has been found recently to be composed of metamorphosed sediments of undetermined age, and of Cretaceous limestones. The great island groups north of Euro-Asia, including Franz-Josef Land, are formed of early Paleozoic and pre-Cambrian rocks overlaid by basalt. Very little is known as to the geological features of northern Siberia.

**The Arctic Ocean** is the body of water encircling the North Pole, and included between the northern boundaries of Europe, Asia, North America, Greenland, and the north Atlantic Ocean above the Arctic Circle, with which latter ocean it is in open connection, while it is in communication with the Pacific Ocean only through the narrow Bering Strait. It drains a vast area, including the northern parts of North America and of Asia. The great rivers, Obi, Yenisei, and Lena, in Asia, and the Mackenzie, in Canada, empty into this ocean. Its area is estimated at between 4,000,000 and 5,000,000 square miles. How much of this area is covered by land is uncertain; but the considerable depth of soundings taken by Arctic explorers would seem to indicate an extensive polar sea. It is possible that land exists to the


ARCTIC REGIONS.
NORTH POLE
Meridian of Greenwich
Longitude West from Greenwich
BERING SEA
GREENLAND
BAFFIN BAY
HUDSON BAY
Hudson Strait
ATLANTIC OCEAN
ARCTIC OCEAN
Yukon
Mackenzie
Greenland
BRITISH ISLES
NORTH SEA
NORWAY
SWEDEN
FINLAND
RUSSIA
SIBERIA
ALASKA
ALEUTIAN IS.
KODIAK I.
ST LAWRENCE I.
NOVAYA ZEMLYA
SPITZBERGEN
ICELAND
FARÖE IS
SHETLAND IS
ORKNEY IS
HEBRIDES
IRELAND
SCOTLAND
ENGLAND
NEWFOUNDLAND
ST JOHNS
Behring Strait
Davis Strait
Baffin Land
Victoria Land
Banks Land
Prince Patrick Land
Ellesmere Land
Grinnell Land
Grant Land
Melville Pen.
Boothia Pen.
Prince of Wales Land
Queen Victoria Land
Wellington Channel
Barrow Str.
Lancaster Sd.
Jones Sd.
Smith Sd.
Kennedy Channel
Robeson Channel
Jan Mayen I.
Iceland
Hammerfest
Archangel
Petersburg
Moscow
Stockholm
Christiania
Copenhagen
Hamburg
Amsterdam
London
Edinburgh
Dublin
Liverpool
Glasgow
Belfast
Cork
Galway
Limerick
Waterford
Wexford
Kilkenny
Tralee
Sligo
Londonderry
Donegal
Ballina
Athlone
Dundalk
Drogheda
Navan
Kells
Mullingar
Longford
Cavan
Monaghan
Enniskillen
Omagh
Strabane
Letterkenny
Carrickmacross
Clones
Ballybay
Castleblayney
Armagh
Portadown
Lurgan
Banbridge
Newry
Downpatrick
Ballynahinch
Lisburn
Belfast
Carrickfergus
Larne
Ballymena
Antrim
Coleraine
Portrush
Portstewart
Limavady
Maghera
Magherafelt
Cookstown
Dungannon
Omagh
Enniskillen
Clones
Monaghan
Carrickmacross
Ardee
Dundalk
Drogheda
Navan
Kells
Mullingar
Longford
Cavan

northwest of the known American Archipelago as a continuation thereof. The water region immediately surrounding the pole is covered with great fields of ice, which are frozen together in winter, but become separated to a greater or less degree (especially at the edges where ice floes are formed) during the summer. This ice area is called the ice pack, and it extends somewhat to the southward of lat. 75° N. above Bering Strait and the adjoining American and Asiatic coasts, between the limits of long. 160° E. and 130° W.; to the westward and eastward of this region the pack limit retreats northward; and in long. 120° W., it is found at about lat. 78° N.; in long. 90° W., at about lat. 78° N.; in long. 85° W., at about lat. 81° N.; in long. 50° W., at about lat. 83° N. On the east coast of Greenland the ice pack descends to lat. 78° N., to retreat again to 82° or 83° N., north of Spitzbergen and Franz-Josef Land, where this latitude is preserved as far east as long. 100° east of Greenwich, when the detour toward the south begins, which reaches its limit at about long. 173° E. This ice is kept in sluggish motion, principally by the winds, in such a manner that a vessel lodged in the ice at a point north of Alaska, or even of Siberia, would gradually drift toward the pole and, passing beyond that, would continue southward until set free from the ice near Spitzbergen or Greenland. Nansen made such a drift in 1893–96. The depth of the Arctic Ocean is variable, being very shoal (only a few hundred feet deep) north of western North America and eastern Asia, where, however, measurements have not been made above lat. 75° north, and very deep (7000 to 13,000 feet) within the Polar Circle to the north of the New Siberia Islands, the Chelyuskin Peninsula (most northern point of Asia), Franz-Josef Land, and Spitzbergen. Northward of the American Arctic Archipelago along the 70th meridan west of Greenwich the depth rapidly increases, a sounding of 9000 feet at the pole on Peary's expedition in 1909 having failed to reach bottom. Northward of the continent of Europe the depth is from 600 to 1200 feet. The Arctic Ocean is apparently affected by tides, in which the monthly variations are more important than are the semi-diurnal, but both these are masked by the influence of the winds and the ice. The assumption that a great portion of the Arctic Ocean has for a long time been covered with a solid pack of ice has suggested for it the name of Paleocrystic Sea, or the Sea of Ancient Ice.

**Arctic Currents.** The open connection between the north Atlantic and the Arctic oceans offers an opportunity for a free interchange of waters between the two. On the east side of the north Atlantic the drift of the surface water is northward, and on the west side the current flows southward. This latter, called the Arctic Current, passes from the Arctic Ocean through the Greenland Sea and Denmark Strait, between Iceland and Greenland; thence along the eastern coast of Greenland; rounds Cape Farewell, and flows up Davis Strait to about lat. 64° N. Here it probably turns toward the west and joins the Labrador Current. There is another movement of water southward from the Arctic Ocean through the straits and bays which communicate with Baffin Bay. The Labrador Current flows southward along the west coast of Baffin Bay, past Labrador and Newfoundland, until it dips into the eastward drift of the warmer waters off the Banks of Newfoundland, where the divers currents prevailing are but feeble. It has been supposed that a part of this current continued southward along the Nova Scotian and New England coasts, but some other explanation must be offered for the cold current which exists on that coast. The Labrador Current, which has a very low water temperature, carries with it icebergs and floes, which eventually disappear by melting in the vicinity of Cape Race. In this latter region heavy fogs prevail whenever winds from the south carry moist, warm air over the cold water. There is another drift of water northward through Bering Strait, but its volume is not great.

**Climate.** The annual average temperatures of the Arctic region are below 32° F. On the island of Jan Mayen, 29° F.; in Spitzbergen, 22° F.; Sea of Kara, 13° F.; Point Barrow, 8° F.; Lady Franklin Bay, 2° F. In Spitzbergen the average temperatures are, in July, 40° F.; in December, —2° F.; those of Lady Franklin Bay, in July, 37° F.; and February, —39° F. In other localities Nares experienced a minimum temperature of —74° F.; Greely, a minimum of —62° F.; Nansen, —52° F., and De Long, —72° F. The distribution of average temperatures for January shows a great area extending northward of the central and eastern part of the Asiatic and American continents, from about lat. 75° to beyond the pole, over which the average temperature is below —35° F., from which central area the temperatures increase in all directions, save on one side, to the following temperatures along the Arctic Circle: —30° F. on the North American Continent, +30° F. in Iceland and the north Atlantic, +5° F. in north Europe, —10° F. at Bering Strait, —31° F. in eastern north Asia; but there is actually a decrease of temperature from the polar region to —60° F. in the neighborhood of Verkhoyansk, Siberia, which is the cold pole of the northern hemisphere. The distribution of average temperatures for July shows a circumpolar area of +35° F., which lies mostly north of lat. 80°, between North America and Europe, but lies below lat. 80° elsewhere, and descends to lat. 70° in northern Alaska. From this central cold area the temperatures increase in all directions to the following values along the Arctic Circle: Western north Atlantic, +45° F.; eastern north Atlantic, +50° F.; northern Europe, +55° F.; northern Asia, +60° F.; Bering Strait, +45° F., and northern North America, +55° F. The winds in January near the pole are generally from the north in the neighborhood of Baffin Bay and northward of North America, but north of Asia they appear to be from the south, veering toward the east over northern Europe. In July the winds are from the southwest in Baffin Bay, from the northwest in the archipelago northward of North America, from the east north of Alaska, from the northeast north of Asia, from the north or northeast north of Europe, and from the north-northeast or northwest in the north Atlantic. The cloudiness averages probably between 40 and 50 per cent in January, and between 60 and 70 per cent in July. The annual precipitation is in general less than 10 inches in the Arctic regions, and most of it falls as snow.

The temperature of the Arctic waters varies from several degrees above freezing to even slightly below freezing at and near the surface; but from a distance of 500 or 600 feet below the

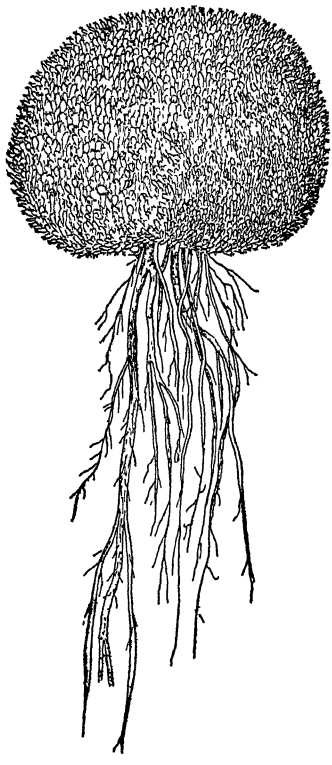
surface down to great depths the temperature is about 1° F. above freezing.

**Inhabitants.** Ranging across the North American Continent, above the Arctic Circle, from Alaska to the eastern end of the archipelago, and also settled on both the west and the east coasts of Greenland, are tribes of Eskimos, a race of aborigines, believed by many authorities to be of Mongolian origin. They live by hunting and fishing, speak an agglutinate language, have no written characters and no well-defined form of government. Whether they have a well-defined form of religion has not been definitely determined. Peary, who examined with some care the isolated tribe in the Whale Sound region of Greenland, reports that the nearest approach to religion is "simply a collection of miscellaneous superstitions and beliefs in good and evil spirits." Other observers, however, report that they have some belief in a future life. For further information see ESKIMO; GREENLAND; ALASKA; ETC. The other important Arctic inhabitants are the Lapps and Finns, and a series of tribes, probably of Mongolian origin, living in the northern part of Siberia; the Samoyedes, Tunguses, Yakuts, Yukahires, and Chukchees. These tribes are supported, some by hunting and fishing, but most by keeping herds of reindeer, which find sustenance in the moss of the tundra. But all the tribes are more or less nomadic in their habits, even those that build villages of timber. Those that depend for livelihood upon their herds of reindeer are sometimes forced to wander to fresh tundra; those that depend upon hunting and fishing follow the game from place to place.

**Flora and Fauna.** The general similarity of modern life-forms throughout the Arctic lands, which has been noted by Heilprin and others, is interesting from a geological standpoint, in that it shows that areas now separated by stretches of water were probably connected in past ages. It seems quite certain that the area now occupied by Bering Sea and Bering Strait was in comparatively recent times a land surface, and that there was a migration of fauna and flora between the American and the Eurasian continents. However, the uniformity of conditions over wide areas is also undoubtedly a factor causing similarities of life-forms, as is shown by the fact that isolated Antarctic islands have closely similar flora.

**Arctic Plants.** In many respects these plants resemble alpine plants (q.v.), and, like them, form one of the three climatic groups of xerophytes (q.v.). Dwarf growth is one of the chief characteristics of Arctic vegetation, and is remarkably well illustrated in a juniper stem reported by Kihlman: The stem was but 3⅛ inches thick, and yet showed 544 growth rings. Plants that grow to a height of one or two feet in Sweden are but one or two inches high in the far North. As in the case of alpine plants, reduction is confined to the stems and leaves, the roots and flowers being as large as in warmer climates. Cushion and rosette plants are well developed. The leaf structure is highly xerophytic, leathery and thick-skinned evergreen leaves being particularly abundant.

The Arctic life conditions have been especially well described by Kihlman (*Pflanzenbiologische Studien aus Russisch-Lapland*, 1890, etc.). The cold and darkness of the long winter nights have but little influence on the vegetation. Of greater importance are the short vegetative period, which excludes many plant species from life in Arctic regions, and the prevalence of dry winds at times when transpiration losses cannot be made good. Kihlman thinks that this latter factor is the chief cause of Arctic phenomena. The absence of trees, then, is due not to the shortness of the period of vegetation, nor to the cold, but to dry winds; this is shown by the fact that trees thrive in the coldest known place in the world (Verkhoyansk, Siberia), and also by the fact that the height of the shrubs is determined by the level of the snow in winter. The continuous though not intense light of Arctic regions checks



DRABA ALPINA.

Showing the densely compacted cushion-form of Arctic-alpine plants.

growth, but favors photosynthesis. One of the peculiarities of Arctic plant life is that there are no gradual seasonal transitions. The buds are largely laid down in the preceding season, and spring into active life at once; growth is checked with equal suddenness in the fall.

The Arctic differs radically from the temperate zone in that plant structures are xerophytic, regardless of water and soil conditions. In fact, one may refer all of the Arctic vegetation to one great plant formation, the tundra. While Arctic plants closely resemble alpine plants ecologically, there are interesting floristic differences. Alpine plants are noted for their endemism, while Arctic plants are similar over wide areas, those of Europe and America being almost identical.

About 1700 species of plants have been found in the Arctic region. In the zone nearest the circle grow a few trees, mainly junipers, dwarf willows, and birches. The tree line in the

Samoyed region ends near the 67th parallel of latitude; at the Yenisei River, near the 65th parallel; at the Lena, near the 71st parallel; at the Mackenzie, near the 68th parallel; at Hudson's Bay it runs down to the 60th parallel; in Labrador, to the 52d parallel. In Greenland it lies near the 62d parallel. Flowering plants, grasses, mosses, and lichens extend to the most northern land seen by man. Examples of those found in all sections of the Arctic world are saxifrages (*Saxifraga oppositifolia* is ubiquitous), several varieties of ranunculus, potentillas, poppies (the Arctic poppy, *Papaver nudicaule*, is found even upon the crests of the cliffs in northern Greenland, where it thrusts its head through the edge of the ice cap to reach the sunlight), drabas, cochlearia, etc. The country richest in variety is Lapland, where are found three-fourths of the species known in the Arctic regions. For the varieties characteristic of each country, see LAPLAND; GREENLAND; SIBERIA; ALASKA; SPITZBERGEN; FRANZ-JOSEF LAND; ELLESMERE LAND; GRINNELL LAND; ETC. See also MUSCI; LICHEN; GRASSES; DISTRIBUTION OF PLANTS; ETC.

**Arctic Mammals.** The similarity of species of Arctic mammals throughout the circle of the globe is even closer than that of plants. Of land mammals there are but few, and many of these are of the same species wherever found. The polar bear (*Ursus maritimus*) has the highest range. Specimens have been found upon the ice pack north of every known land. The bear, however, is never found far from the coast, either inland or at sea. (See BEAR.) The Arctic fox (*Vulpes lagopus*) has almost as high a range, and is also found throughout the entire Arctic land area. The lemming is found in every Arctic country except Franz-Josef Land. The reindeer (*Rangifer tarandus*) is found around the globe occasionally as far north as about the 79th parallel, but does not inhabit the great islands in the Arctic Ocean. The musk ox (*Ovibos moschatus*) has been common within the memory of man as far west as Point Barrow; but at present its range extends from the Mackenzie River east across the continent to Grinnell Land and again across the northern part of Greenland. The Arctic hare (*Lepus glacialis*) is found in the northern part of North America and of Greenland, and in these regions it reaches the highest known land. Among the other Arctic land animals are the wolverine, or glutton (*Gulo arcticus*), which is found in North America and is reported to have existed in Greenland, though such reports lack scientific verification; the Arctic wolf; and the Eskimo dog, which is supposed by most authorities to have been derived from the wolf by taming.

The most important of the sea mammals are the whales and seals. The right whale (*Balœnus mysticetus*) is found in the waters east of Greenland, in Baffin Bay, and again north of Bering Strait. The range of individuals is exceedingly wide; a whale bearing a Greenland harpoon has been found in the Bering Strait region. The razor-back, the hump-back, and the bottle-nose, the grampus, the white whale, and the narwhal, are also found in the Arctic Ocean. See WHALE.

Among the pinnipeds, the most remarkable is the walrus (q.v.), which formerly inhabited the seas near the coasts of all Arctic lands, but on account of slaughter by fishermen for ivory, skin, and oil, has been driven from Europe and from the southern part of Baffin Bay. The north Atlantic species (*Odobœnus rosmarus*) is still plentiful in the Smith Sound region and in Spitzbergen and Franz-Josef Land, and the Pacific species (*Odobœnus obesus*) is found on the northern coast of Alaska and Kamchatka. Among species of hair seals which inhabit the Arctic seas, the most important is the *Phoca fœtida*, whose range covers the Arctic regions near the shores and ice fields, and extends south to Labrador, the Orkneys, the Hebrides, the gulfs of Bothnia and of Finland, and along the coasts of Siberia and Alaska, into Bering Sea. The harp seal (*Phoca Grœnlandica*) and the bearded seal (*Erignathus barbatus*), which is the largest of the north Atlantic pinnipeds next to the walrus, also have a circumpolar distribution. The bladder-nose or hooded seal (*Systophora cristata*) ranges from Greenland to Spitzbergen and along the northern coast of Europe. For other seals, see SEAL.

**Arctic Birds.** Birds are very plentiful throughout the whole of the Arctic region. The little auk (*Mergulus* or *Alle alle*) and the guillemot (*Uria lomvia*) are found in thousands in whatever region there are cliffs to serve as nesting spots. Raven (*Corvus corax*), snow buntings (*Plectro phenax nivalis*), and sandpipers have been seen in the remotest northern land regions. The snowy owl (*Nyctea nivea* or *nyctea*) and the gyrfalcon (*Falco rusticolus*), though in certain regions rare—as, for instance, Greenland and Franz-Josef Land—still inhabit all Arctic lands. Various species of gulls—Ross's gull (*Rhodostethia rosea*), the glaucus gull (*Larus glaucus* or *hyperboreus*), the ivory gull (*Pagophila eburnea* or *alba*)—also range very far north; Nansen saw Ross's gulls and ivory gulls upon the ice pack above Franz-Josef Land. Among the other characteristic Arctic birds are the eider duck, kittiwakes, skuas, teal, petrels, puffins, and ptarmigans. Further information concerning the mammals and birds of the Arctic region will be found under the names of the animals. See also DISTRIBUTION OF ANIMALS, and the titles of the countries included in the Arctic region.

**Arctic Insects.** Insects have been collected wherever exploration has extended and vegetation was known. Bees and parasitic hymenopterans occur as far as the Pedicularis or other flowers bloom—up to 82° or more in Grinnell Land, and in Greenland. Beetles are less hardy, and few are known north of the Arctic Circle, but flies, butterflies, and moths have been taken up to 83° on the American side of the pole. Thus the Nares expedition brought back several species of Lepidoptera, mostly of common genera (Argynnis, Colias, Lycœna, etc.) of butterflies, while the few moths represent various families. These insects have only about six weeks in which their larvæ can hatch and feed, and probably do not mature in a single season; but it must also be remembered that the whole 24 hours of the days of their brief career are sunny, and they fly about continuously.

**Marine Life.** More than 125 species of fishes have been taken within the Arctic Circle, and valuable fisheries exist on the northern coasts of Russia, in the waters about Spitzbergen and Nova Zembla, and might be organized north of Bering Strait. The most important are cod, halibut, flatfish, and related forms; but many bottom-feeding families are represented as far north as knowledge extends. Several species of salmon or trout ascend Arctic rivers, the most

northerly case being that of *Salmo arcturus*, taken in Grinnell Land (lat. 82°). Food for many of these fishes, and for seals and walruses, is afforded by a large variety of mollusks, including squids, clams, and mussels, and a long list of gastropods, chiefly of the families Pleurotomidæ, Buccinidæ, Nataeidæ, and Trochidæ. Nearly 100 species have been catalogued, a large proportion of which also exist in temperate latitudes. The great abundance of diatoms and the general prevalence of low algæ sustain these and similar low animals. No mollusks are more widespread and numerous, however, than the pteropods, especially of the genera *Clione* and *Limacina*, and they furnish an important element in whale diet. There are also chitons and sea slugs. Crustacea abound in the Arctic seas. A few are of the higher forms, allied to crabs and shrimps, but mainly they are entomostracans of small size and pelagic life. Such amphipods as *Anonyx* and *Hippolyte* are well represented in the extreme north at various depths, as also are the copepods, isopods, barnacles, and pycnogonids; and the specimens of such species as are also known southward are very much larger than their southern equivalents. All of these, and especially the copepods, are of great economic importance as food for whales. They are an example of the power of resisting cold possessed by these creatures, for they survive freezing for a long period, and their eggs are still more hardy. The shores and shallows of the Arctic Ocean also abound in annelids, of which 20 or more species have been collected, and which form an important element in the diet of the larger denizens of those seas; and the still humbler ranks of life are represented by jellyfishes and hydroids, especially varied and numerous north of Alaska, and by polyzoans and test-bearing protozoans in great numbers. Seaweeds diminish toward the extreme north to a very few olive-colored kinds, and seem to be more abundant north of Europe than in the American Arctic regions.

**Discoveries.** For explorers the principal entrance to the Arctic Ocean is the passage between Nova Zembla and Franz-Josef Land; the next most convenient entrance is through Davis Strait. American explorers have generally passed up Davis Strait, Baffin Bay, and Smith Sound, and through the very narrow Kennedy Channel; and Markham in 1875 pushed the ship *Alert* through Robeson Channel into the Arctic Ocean, where it wintered at Floeberg Beach, and Peary's steamer *Roosevelt* later wintered at Cape Sheridan on the same coast.

As to the efforts to reach the North Pole itself, it may be stated that by the use of sledges Parry, in 1827, reached 82° 45′, far outstripping all previous records; Markham, of the British expedition under Nares, attained 83° 20′; Lockwood, of Greely's expedition, reached 83° 24′; Peary, in 1900, reached 83° 54′; in 1902, 84° 17′; in 1906, 87° 6′; and in 1909 the pole itself. By the passage eastward toward the New Siberian Islands and the subsequent drift in the ice floe, Nansen's ship, the *Fram*, in 1895, reached 85° 57′; but having previously left the ship, by a sledge journey over the ice-pack, Nansen and Johannsen reached 86° 14′. On April 26, 1900, Cagni, of Abruzzi's expedition, by a rapid march northward from Franz-Josef Land, reached 86° 33′.

For an account of exploration in the Arctic regions, see POLAR RESEARCH. For further information concerning the magnetic phenomena, see MAGNETISM, TERRESTRIAL.

**Bibliography.** A very good bibliography of the Arctic region is Chavanne, aided by Karpf and Mommier, *Die Litteratur uber die Polar-Regionen der Erde* (Vienna, 1878). In this work may be found the titles, classified, of most of the important books that had been written up to the time of its publication. General Greely's *Handbook of Arctic Discoveries* (5th ed., Boston, 1910) also gives valuable lists of books, classified according to the various spheres of Arctic exploration. A fairly comprehensive work covering *The Natural History, Geology, and Physics of Greenland and Adjacent Regions* (London, 1875) was prepared by T. Jones as a manual for the British Admiralty Expedition of 1875–76. The information presented by the contributors to this work extends somewhat beyond the regions "adjacent" to Greenland, but needs to be supplemented, and in a few passages corrected, by the reports of later explorations. Of such reports, the most important are (1) those of the International Polar Expeditions of 1881–83, published by the various coöperating governments. Those of the United States appeared (*a*) by Greely under the title, *Report on the Proceedings of the United States Expedition to Lady Franklin Bay* (Washington, 1888); (*b*) by Ray, under the title, *Report of the Expedition to Point Barrow;* that of Austria, by Wohlgemuth, appeared under the title, *Osterreichische Polarstation Jan Mayen* (Vienna, 1886); that of Denmark, by Paulsen, under the title, *Expedition Danoise, Godthaab* (Copenhagen, 1889–93); that of Great Britain, by Dawson, under the title, *Fort Rae* (London, 1886); that of Russia, by Andreyeff and Lentz, under the title, *Beobachtungen der russischen Polarstationen auf Nowaja Semla* (St. Petersburg, 1886–95), etc. (2) Wright, *Greenland Ice Fields and Life in the North Atlantic* (New York, 1896), which contains a brief description of the flora and fauna of Greenland and a discussion of Arctic glacial phenomena; (3) Conway, *The First Crossing of Spitzbergen* (London, 1897); (4) Jackson, *A Thousand Days in the Arctic* (New York, 1899), which deals with Franz-Josef Land, and *The Great Frozen Land* (New York, 1895), which deals with the Samoyed Peninsula; (5) Peary, *Northward over the Great Ice* (New York, 1898), which contains a valuable chapter on the most northern Eskimos; (6) Peary, *The North Pole* (New York, 1910); (7) Nansen, *Farthest North*, which sets forth the drift of a vessel frozen in the ice across the Arctic Ocean. Of fundamental importance is *The Norwegian North Polar Expedition 1893–1896: Scientific Results*, edited by Nansen. Books on Arctic currents are: Dittmar, *Das Nord-Polarmeer* (Hanover, 1901), and the report published by the Norwegian government of the investigations of the ship *Ingolf* in the region of east Greenland and Iceland.

Valuable works on the inhabitants are: Boas, "The Eskimo of Baffin Land and Hudson Bay" (*Bulletin, American Museum of Natural History*, vol. xv); Pecher, *The Races of Man and their Geographical Distribution* (London, 1876); Ratzel, *The History of Mankind* (3 vols., trans., New York, 1896). For the distribution of animals consult Heilprin, *The Geographical and Geological Distribution of Animals* (New York, 1887); for the distribution of plants consult Heer, *Flora Fossila Arctica* (7 vols., Zurich, 1868–80).

**ARCTIUM,** ärk'shĭ-ŭm. See BURDOCK.

**ARCTOI'DEA.** See CARNIVORA.

**ARC'TOSTAPH'YLOS** (Gk. *ἄρκτος, arktos,* bear + *σταφυλή, staphylē,* grape-bunch). A genus of shrubs and small trees closely related to *Arbutus.* Most of the species are American; two, however, are circumpolar. The red bearberry (*Arctostaphylos uva-ursi*) is one of them. It is a trailing evergreen shrub, which bears small flowers and red berries. Its associated species, *Arctostaphylos alpina,* has berries which are black when ripe and leaves which are not evergreen. The leaves of *Arctostaphylos uva-ursi* are used in medicine. The manzanita of California is *Arctostaphylos pungens.* It is a shrub or small tree 30 feet high that sometimes forms almost impassable thickets. Only the trailing forms are entirely hardy.

**ARCTOWSKI,** ärk-tôf'skē *or* -tôs'kē, HENRYK (1871—). A Polish scientist and explorer. He was born in Warsaw and studied chemistry and geology at the universities of Paris, Liége, and Zurich from 1888 to 1896. After a year at the British Museum he set out with the Belgian Antarctic expedition in 1897, in charge of the physical observations. During the two years' stay of this expedition in the south polar regions he discovered and studied the geology of the Antarctic Andes and established the first complete record of meteorological observations made in that part of the world. On his return to Europe he became assistant in the Royal Observatory of Belgium and remained there until his removal to the United States in 1909. He was appointed chief of the science division of the New York Public Library in 1911 and became a member of many American and European scientific societies. His published writings include *Die antarktischen Eisverhältnisse* (1903): *L'enchainement des variations climatiques* (1909), and many reports and articles in scientific journals of this and other countries.

**ARCTU'RUS** (Gk. *ἄρκτος, arktos,* bear, the Great Bear + *οὖρος, ouros,* guardian). The principal star in the constellation Boötes (the 'herdsman'). Arcturus is of the first magnitude and is very conspicuous in the northern heavens. According to the *Harvard Photometry,* it is exceeded in brightness by only two stars, Sirius and Canopus. Its parallax, as determined by Elkin, is 0".024. Its distance from us is therefore about 8,500,000 times the mean radius of the earth's orbit, and its light takes about 125 years to reach us. It may be found by continuing the curve of the three stars which form the handle of the Dipper, or Ursa Major (q.v.).

**AR'CUA'TION.** See LAYERING, ARCUATION.

**ARCUEIL,** ärk'ē'y' (anciently, Lat. *Arcus Iulianus*). A suburb of Paris lying 4 miles south of that city (Map: Paris and vicinity). It is a holiday resort and noted for the ruins of an aqueduct built by order of the Roman Emperor Julian and for several aqueducts of modern times. Pop., 1901, 8425; 1911, 11,319.

**AR'CUS SENI'LIS** (Lat. bow of old age), or GERONTOXON (Gk. *γέρων, gerōn,* old man + *τόξον, toxon,* bow). A change occurring in the cornea of the eye, in consequence of fatty degeneration of its margin. The *arcus senilis* usually commences at or even before the age of 40 years, as an opaque whitish crescent, skirting either the upper or lower margin of the cornea; and from this beginning it extends along the edge till it finally becomes a complete circle, which sometimes assumes a chalky whiteness. On close examination it may be seen that a narrow interval of partially clear cornea always intervenes between the arcus and the opaque sclerotic. As far as vision is concerned, the formation of this circle is of little importance. It is usually associated with arteriosclerosis and fatty degeneration of other portions of the body, including the heart.

**ARCY,** är'sē', GROTTO OF. A cavern of remarkable beauty, 12 miles east of Auxerre, France. It is supposed to have been used in early times as a stone quarry, and possibly the material for the Auxerre cathedral was taken from it. There are three main divisions with an aggregate length of about 2900 feet.

**ARD,** or **AIRD.** A Celtic root, meaning 'height' (cf. Lat. *arduus,* high), which appears in many geographical names, especially in Ireland and Scotland.

**ARDAHAN,** är'dà-hän'. The capital of a district in the territory of Kars, Transcaucasian Russia (Map: Russia, F 6). It is situated 45 miles northwest of Kars on the Kur River. Its strategical importance on the military route from the Black Sea to the Turkish frontier and as the point of juncture of the roads to Batum, Akhaltsikh, Kars, and Erzerum was recognized by the Turks, who, by constantly improving its fortifications, finally made it a powerful stronghold. In 1877, 20,000 Russians under Devel and Heiman successfully stormed it. By the Treaty of San Stefano and the Berlin Congress (1878), Ardahan and the surrounding country were ceded to Russia. Pop., 800.

**AR'DAN.** A small South American linguistic stock in the region lying between the rivers Napo and Nanay, in extreme northeast Peru-Ecuador.

**ARDASHIR,** är'dà-shēr' (Pahlavi *Artaxsatar,* later Pers. *Ardasir*). The name of three monarchs of the Sassanian dynasty of Persia (see SASSANIDÆ), and a later form of the old name Artakhshathra, or Artaxerxes (q.v.). The most important of the three was Ardashir I, or Artakhshatar Papakan, who founded the Sassanian dynasty by overthrowing Artabanus, the last of the Parthian kings, and strengthened his power by further conquests, and ruled over Persia 226–240 A.D. His records are contained in the *Kārnāmē ī Artakhshīr ī Pāpakān,* which have been translated into English and Gujerati by Darab Sanjana (Bombay, 1896). The other two of the name were Ardashir II, 379–383; Ardashir III, 628–629. See PERSIA.

**AR'DEA.** A town in ancient Italy, capital of the Rutuli and their King Turnus (q.v.).

**ARDEBIL,** är'de-bēl', or **ARDABIL,** är'dà-bēl'. A celebrated town of Azerbaijan, Persia, situated in lat. 38° 15' N., long. 48° 19' E., on a plain over 4000 feet above sea level, and 40 miles from the Caspian Sea (Map: Persia, C 2). It has a moderate climate, and its picturesque environs and the mineral springs in its vicinity make it the favorite abode of the Persian rulers, whose tombs it contains. Before the Russo-Persian War (1826–28) the city was strongly fortified under the French. During the war it was captured by the Russians and was subsequently nearly ruined by earthquakes. Since the Middle Ages it has derived some importance from its proximity to the Lenkoran-Tabriz caravan route. Its population is estimated to be above 10,000.

**ARDECHE,** är'dĕsh'. A department in the

south of France. It takes its name from the river Ardèche, a tributary of the Rhône, and includes the northernmost part of the old province of Languedoc. Area, 2145 square miles. Pop., 1896, 360,599; 1906, 347,140; 1911, 331,801. Ardèche is almost wholly mountainous. The upland, which has winter for about six months, is devoted to pasturage, while the terraces and valleys near the Rhône have a warm climate and produce good white and red wine, olives, dates, almonds, chestnuts, vegetables, etc. Lead, iron, copper, and manganese are mined, and lime is quarried. Leather, silk, paper, and flour are manufactured, and these with lumber form the principal articles of commerce. Capital, Privas.

**AR'DEN,** EDWIN HUNTER PENDLETON (1864–1918). An American actor and manager. He was born, Feb. 13, 1864, in St Louis, Mo. He left home at the age of 17, and after a variety of experiences in the West went upon the stage in 1882, with J. W Keene's company, in Chicago. Besides his engagements with other managers, he traveled for a number of years with his own company and appeared in plays of his own authorship. He has written, either alone or in collaboration, *Eagle's Nest*, *Barred Out*, *Raglan's Way*, and *Zorah*.

**ARDEN,** FOREST OF. A wood in Warwickshire, in old times very extensive. It is supposed to have been a hunting ground of Robin Hood. Certain authorities believe that Shakespeare used it as a background in *As You Like It;* others assert that his scenery was taken from the forest of Ardennes.

**ARDENNES,** är'dĕn' (Celt. high wooded valley, from *ard;* Lat. *arduus*, high; the ancient Lat. *Arduenna Silva*, Ardenne Forest). A wild, hilly region, extending over portions of Belgium and France and gradually sloping toward the plains of Flanders. In early times the name was given to a vast forest lying between the Rhine and the Sambre, a distance of about 160 miles. The average height of the hills is less than 1300 feet; but in the east, Mont Saint-Hubert attains an elevation of 2100 feet. Large tracts of this region consist of gently undulating plateaus densely covered with oak and beech forests, while other portions are marshy, heathy, and barren. The districts through which the Meuse and other rivers flow present some extraordinary appearances. The channel of the river is sometimes bound in by rugged and precipitous cliffs more than 600 feet high. The principal rocks of the Ardennes are clay slate, graywacke, quartz, etc., interspersed with extensive strata of Paleozoic limestone. There are coal and iron mines in the northwest; lead, antimony, and manganese are also found. There is little cultivation of grain, but cattle and sheep are extensively raised. Consult A. Meyrac, *Villes et villages des Ardennes* (Charleville, 1898).

**ARDENNES.** A frontier department in the northeast of France, formerly a part of the old province of Champagne. Area, 2028 square miles; pop., 1896, 318,865; 1906, 317,505; 1911, 318,896. The northeastern part of Ardennes belongs to the basin of the Meuse; the southwest is watered by the Aisne; and both of these rivers, united by the canal of Ardennes, receive several affluents. Agriculture is carried on extensively in the fertile valleys, cereals, grain, and potatoes being the principal crops. In the mountainous districts there are extensive forests and tracts of grazing lands. The vine is cultivated at Mézières, in the southwest. In the north, near Givet, marble is obtained; but the prevailing rock is limestone, veined with lead and iron. Slate, marble, and iron, porcelain clay, and sand for making glass are obtained. Other leading industries are saw milling and the manufacture of iron, leather, flour, and sugar. Most of these commodities are exported. Capital, Mézières. Consult A. Joanne, *Le departement des Ardennes* (Paris, 1898).

**ARDENNES,** THE WILD BOAR OF. An appellation of William de la Marck, a lawless baron of the reign of Louis XI, whom Scott has introduced in several chapters of *Quentin Durward.*

**AR'DEN OF FEV'ERSHAM.** The first English "*bourgeois* tragedy." It deals with a murder by a wife and her paramour. The plot was drawn from an actual occurrence contemporary with it. It was first printed in 1592; its authorship is unknown. The play has been attributed both to Shakespeare and to Kyd. In 1736 Lillo, author of *George Barnwell*, began an adaptation of it, which was completed after his death by Dr. Hoadley and produced in 1790. For further information, consult Saintsbury, *History of Elizabethan Literature* (London, 1887).

**ARDITI,** är-dē'tē, LUIGI (1822–1903). An Italian composer and musical conductor. He was born at Crescentino, Piedmont, July 16, 1822. After graduating from the Milan Conservatory in 1842, he began his career as a violin virtuoso, traveling with Bottesini, the famous double-bass player. With the Havana Opera Company, of which he became conductor, he visited New York in 1847 and during subsequent seasons, conducting in 1854 the first performance at the Academy of Music, where he brought out his opera, *La Spia* (based on Cooper's novel, *The Spy*). In 1857 he was conductor at Her Majesty's Theatre in London. In 1869 he conducted *The Flying Dutchman*, the first performance of a Wagner opera in England. In 1878 and many subsequent seasons he again conducted opera in New York. His waltz songs *Il Bacio* (to which Piccolomini gave great vogue) and *Fior di Margharita* (sung by Patti and other great prima donnas), are famous. He was Patti's favorite conductor. His other operas are *I Briganti* (1841) and *Il Corsaro* (1856). He published *My Reminiscences* (New York, 1896), containing a good deal of valuable information besides interesting chitchat. He died, May 1, 1903, at Hove, near Brighton.

**ARD'MORE.** A city and the county-seat of Carter Co., Okla., about 100 miles south of Oklahoma City; on the Gulf, Colorado, and Santa Fe, the Rock Island, San Francisco, and Oklahoma, and New Mexico and Pacific railroads (Map: Indian Territory, F 4). It is the seat of Hargrove College and St. Agnes's Academy. It controls large commercial interests in cotton and asphalt; has deposits of natural gas and many large oil wells; and is an important stock-raising centre. It has municipal water works. Ardmore was settled in 1886 and incorporated in 1893, but has adopted the commission form of government. Pop., 1900, 5681; 1910, 8618; 1920, 14,181.

**ARDOCH,** är'dŏg. A small village in Perthshire, Scotland, 8 miles south-southwest of Crieff (Map: Scotland, E 3), with the best-preserved Roman camp in Britain. The camp is 2½ miles north of Greenloaning station on the Caledonian Railway, in the grounds of Ardoch House. The intrenched works form a rectangle 500 by 430

feet, the four sides facing the cardinal points. The north and east sides are protected by five ditches and six ramparts, these works being 270 feet broad on the north side and 180 feet on the east. A deep morass exists on the southeast, and the perpendicular banks of Knaig Water, rising 50 feet high, protect the camp on the west. The prætorium, or general's quarter, now called Chapel Hill, rises above the level of the camp, but is not exactly in the centre, and is nearly a square of 60 feet each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the prætorium under the bed of the Knaig. Not far north of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist. Pop., 1901, 916; 1911, 863.

**ARDROS'SAN** (Gael. *ard*, high + *rossan*, point). A small seaport town and summer resort in Ayrshire, Scotland, on the Firth of Clyde, 32 miles by rail southwest of Glasgow (Map: Scotland, D 4). Its harbor, sheltered by an island off the coast, is one of the safest and most accessible on the west coast of Scotland and has been greatly improved by the earls of Eglinton, to whose efforts the prosperity of the town is largely due. There is a large export of coal and pig iron from this place, and shipbuilding and fishing furnish occupation for many of the inhabitants. On a hill above the town stand the ruins of Ardrossan Castle, said to have been surprised by Wallace when held by the forces of Edward I. Population of the police burgh in 1901, 5933; in 1911, 5760.

**ARE**, âr (Lat. *area*, piece of level ground). The unit of the French land measure; a square, the side of which is 10 meters (or 32.809 feet) long, and which, therefore, contains 100 square meters = 1076 English square feet. The next denomination in the ascending scale is the *decare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares = 2.47 English statute or imperial acres. See METRIC SYSTEM.

**A'REA** (Lat. piece of level ground, vacant place). The superficies of any bounded surface or space. The calculation of areas, or mensuration of surfaces, is one of the ultimate objects of geometry. Area is commonly measured by a square unit, as the square inch, square yard, square meter, square degree. (See MENSURATION; QUADRATURE.) In antiquity this word meant any space free of buildings, such as a square, inclosure, court, arena of a circus, space around a temple, or any other public building. In this last connection, the area was consecrated ground. So, in connection with early Christian churches there were areas protected by law, in which the faithful were buried. In modern use the word is applied also to the open space of a narrow front yard or back court, or in connection with a basement.

**ARE'CA** (Sp. Portug. from Canarese *adiki*). A genus of palms containing about 15 species. The fruit is a fibrous one-seeded drupe, a nut with an outer fibrous husk. *Areca catechu*, the Pinang palm, or betel-nut palm, is a native of the East Indies, whose nut yields a sort of catechu. (See CATECHU.) This areca nut or betel nut, is very much used in all parts of the East, the chewing of it with quicklime and the leaf of the betel pepper being one of the most prevalent habits of the people. (See BETEL.) The fruit is about the size of a hen's egg, smooth, orange or scarlet, the fibrous husk about half an inch thick. When chewed, it reduces the saliva and stains the lips and teeth. It is said to stimulate the digestive organs and to prevent dysentery. Areca nuts form a considerable article of trade in the East. The timber of the palm which produces them, and its leafstalks and spathes, are also used for domestic purposes. The tree is often 40 to 100 feet high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets one to two feet long. In Malabar an inebriating lozenge is prepared from the sap. *Areca oleracea*, or *Oreodoxa oleracea*, the "cabbage palm" of the West Indies, is a very tall tree, 100 to 200 feet, whose huge terminal leaf bud is sweet and nutritious and is sometimes used for the table as cabbage; but when it is cut off the tree is destroyed. The stem of this tree, notwithstanding its great height, is remarkably slender. The nuts are produced in great numbers; they are about the size of a filbert and have a sweet kernel. *Areca sapida*, now called *Rhopalostylis sapida*, the New Zealand palm, is remarkable as extending southward beyond the geographical limits of any other of its family, as far, indeed, as lat. 38° 22′ S. It is a small palm, only from 6 to 10 feet high, with leaves 4 to 6 feet long. The young inflorescence is eaten. *Areca vestiaria*, a native of the East, is so called because clothing is made from its fibres. For illustrations, see PALMS.

**ARECIBO**, ä'rā-sē'bō. The chief city of the department of the same name, rather picturesquely situated on the northern coast of Porto Rico (Map: Porto Rico, C 2). It is about 40 miles west of San Juan, with which it is connected by rail, and has a rather shallow harbor and some sugar mills, the product of which is the principal export. The city is surrounded by coffee plantations and fine grazing land. Pop., 1899, 8008; 1910, 9612.

**AR'EIOP'AGUS.** See AREOPAGUS.

**AR'EMOR'ICA.** See ARMORICA.

**ARE'NA** (Lat. sand, sandy place, beach, coast). The central part of an amphitheatre, inclosed by the seats. In it the gladiatorial contests and other games were held, and the name "arena" was given to it because of the sand which was spread to soak up the blood. The term is extended to mean any flat inclosure for the exhibitions of shows, games, sports, and contests, and even figuratively to the region or field of political and other intellectual contests. See AMPHITHEATRE.

**AR'ENA'CEOUS ROCKS** (from Lat. *arena*, sand), or Psammites, Gravel and Sand Rocks, composed mainly of quartz particles deposited through water or air. They are mechanical sediments produced by the disintegration and removal of silicious rocks by the action of atmosphere, rain, rivers, frost, lake and ocean waves, and other superficial agencies. The arenaceous rocks, or psammites, include plain sand, river sand, sea sand, sandstone, graywackes, quartzite, gravel, shingle, and conglomerate (q.v.). Seldom are they composed entirely of quartz; the quartz being commonly associated with fragments of other minerals such as feldspar, mica, iron ore, hornblende, etc., all of which may be cemented by carbonate of lime or magnesia, quartz, or iron. Arenaceous rocks grade by intermediate stages into argillaceous rocks through increasing admixtures of clay, and into

calcareous rocks by admixture of lime. See ARGILLACEOUS ROCKS; CALCAREOUS ROCKS; ROCKS.

**ARENALES,** ä'rā-nä'lĕs, JUAN ANTONIO ALVAREZ DE (1755–1825). An officer in the patriot army in the Peruvian revolution against Spain. In 1820, with a body of 1000 men, he was sent from Pisco with orders to strike into the country across the Andes and proceed by a circuitous route to Lima, there to meet the main army—a feat not unlike Sherman's famous march—which he accomplished most successfully, completely defeating the Spanish army at Cerro de Pasco.

**AR'ENA'RIA** (Lat. *arenarius*, pertaining to sand, from *arena*, sand), or SANDWORT. A genus of plants of about 150 species, belonging to the family Caryophyllaceæ. The species are annual and perennial tufted herbs, rarely somewhat shrubby, and natives of the temperate and colder parts of the world. Some of them are arctic and alpine plants. Many of them are chiefly found in sandy soils. The flowers are generally small and inconspicuous.

**ARENBERG,** ä'ren-bĕrk, or **AREMBERG,** ä'rem-bĕrk. A duchy of the Holy Roman Empire, with territory mainly in Germany. The lords of Aremberg became important in the twelfth century, but the male line died out in 1280. The heiress married the Count de La Marck and had two sons, of whom the elder became Count de La Marck, and the younger, Lord of Aremberg. The male line died out again, and in 1547 the heiress married a member of the family of Ligne who was made a Count of the Empire by Charles V. He distinguished himself in the Dutch wars. His services and the fortunate marriage of descendants added to the prestige and property of Aremberg, and the title was raised to Duke. See the following articles.

**ARENBERG,** or **AREMBERG,** AUGUST MARIA RAIMUND, PRINCE (1753–1833). A Belgian soldier and author—also known as Count La Marck—a brother of the Duke of Arenberg. He served in India in 1780, and participated in the Belgian revolt of 1789, but afterwards swore allegiance to the Emperor Leopold II. He was an intimate friend of Mirabeau during the French Revolution, and his *Correspondance entre le Comte de Mirabeau et le Comte de La Marck* (edited by Vacourt, 2 vols., Brussels, 1851) must be considered a valuable contribution to the history of the French Revolution.

**ARENBERG,** or **AREMBERG,** LEOPOLD PHILIPP KARL JOSEPH, DUKE OF (1690–1754). An Austrian field marshal. He was born at Mons, of one of the most illustrious families of Belgium. At 16 he was colonel of a regiment, and councilor of state to Archduke Charles, the Austrian claimant to the Spanish throne, who subsequently became Emperor as Charles VI. He fought at Malplaquet in 1709 and in the same year became grand bailiff of Hainault. In 1716 he served in Hungary under Prince Eugene, and fought at Belgrade in the following year; on returning to the Netherlands in 1718 he was made military governor of Hainault, and subsequently commander in chief of all the Austrian forces in the Netherlands, with the rank of field marshal. In 1743 he led his troops with great gallantry at Dettingen. Afterward he served in Silesia under Charles of Lorraine, and in 1747 was president of the commission in control of the Netherlands. He was a lover of the sciences and of letters and was a patron of J. J. Rousseau. He also corresponded with Voltaire and with Frederick the Great. The fullest account of Leopold of Arenberg is that given by Gachard, in the *Biographie Nationale*, published by the Royal Academy of Belgium and founded on documents in the Belgian royal archives.

**ARENDAL,** ä'ren-däl. A town on the southeast coast of Norway, situated near the mouth of the Nid Elf in the Bay of Christiania, 36 miles northeast of the city of Christiansand (Map: Norway, D 7). It is built partly on piles, partly on rock, with numerous canals intersecting it, and this circumstance, as well as its situation, gives it a very romantic aspect and has caused it to be called "The Little Venice." The bay, which is protected by the island of Tromö, forms an excellent harbor and favors the commerce of the town. The exports are iron from the neighboring mines, timber, and wood pulp. Shipbuilding is also carried on, and, on a smaller scale, distilleries and tobacco factories. Pop., 1900, 4370; 1910, 10,315.

**ARENDT,** ä'rĕnt, OTTO (1854—). A German economist and politician, born in Berlin. He studied law and political science at Leipzig and Freiburg, and with the appearance in 1880 of his work, *Die vertragsmassige Doppelwahrung*, became an active advocate of bimetallism. He was one of the founders of the society for the introduction of international bimetallism (1882), and became the real head of the party in Germany. In 1885 he was elected to the Prussian House of Representatives as a member of the Liberal Conservative party. From 1888 to 1898, he was editor of the *Deutsches Wochenblatt*, in which he advocated colonial expansion and the coalition of national parties. His published works include *Leitfaden der Wahrungsfrage* (17th ed., 1895); *Die Ursache der Silberentwertung* (1899); *Die parlamentarischen Studienreisen nach West- und Ost-Afrika* (1906); *Geld, Bank, Börse* (1907).

**ARENDT,** ä'rent, RUDOLF (1828–1902). A German chemist, born at Frankfurt-on-the-Oder. He studied at the University of Leipzig and after 1861 taught at the commercial high school there. The best known among his works is his *Technik der Experimental Chemie* (2 vols., 1881; 3d ed., 1900). Arendt was for many years editor of the *Chemisches Centralblatt*. He also wrote *Anschauungsunterricht in der Naturlehre* (4th ed., 1886); *Leitfaden fur den Unterricht in der Chemie* (7th ed., 1899); *Grundzuge der Chemie* (8th ed., 1903).

**ARÈNE,** ä'rĕn', PAUL AUGUSTE (1843–96). A French writer and Provençal poet born at Sisteron. He was director of the Lyceum at Marseilles and afterward of that at Vanves, and gained his first success as an author with his *Pierrot héritier* (presented in 1865), a one-act comedy in verse. His further publications include the dramatic works *Jean des figues* (1870), *Les comédiens errants* (1873), and *Le duel aux lanternes* (1875), some prose fiction, such as *Au bon soleil* (1879), and *Le canot des six capitaines* (1888), and a volume of descriptions of travel, *Vingt jours en Tunisie* (1884). His work was marked by delicate humor. He was a regular contributor to *La République Française*, *L'Evénement*, and *Gil Blas*. Consult Armand Silvestre, preface to *Poésies* (Paris, 1900); Lorenz Petry, dissertation (Halle, 1910).

**ARENG' PALM.** See GOMUTI.

**ARENS,** ä'rens, FRANZ XAVER (1856—). An

American musician. He was born at Neef, Germany, but came to America at the age of 10. Later he went again to Germany to study music. He took the regular course at the Conservatory in Dresden, where he graduated in 1885. From 1885 to 1888 he conducted the Philharmonic Orchestra of Cleveland, Ohio, and also appeared in other cities as conductor of music festivals. From 1890 to 1892 Arens was abroad in charge of "American Composers" concerts. In 1900 he founded the People's Symphony Concerts in New York for the purpose of bringing the best music to the poorer classes. The admission fee is merely nominal. From the beginning these concerts were successful, and their scope was gradually extended, so that from a few orchestral concerts, conducted personally by Mr. Arens, chamber-music concerts by regular organizations became a feature. This movement has spread to other cities.

**ARENSKI,** ä-rĕn'skē, ANTON STEPANOWITCH (1861–1906). A distinguished Russian composer. He was born at Novgorod, July 30, 1861, and died at Tarioki (Finland), Feb. 25, 1906. From 1879 to 1882 he was a pupil of the Conservatory at St. Petersburg, where he studied under Rimski-Korsakoff (q.v.). In 1883 he became professor of composition at the Imperial Conservatory in Moscow, where in a short time he gained a national reputation as a successful teacher. He returned to St. Petersburg in 1895, succeeding Balakireff (q.v.) as conductor of the Imperial Court Chorus. Although a contemporary of the Neo-Russian composers, he has little in common with them; he rather inclines to the ideals of Glinka (q.v.) and Tschaikowski (q.v.). His works comprise the operas: *The Dream on the Volga* (1892); *Raphael* (1894); *Nala and Damayanti* (1899); for orchestra: two *Symphonies* (Bm. and A); *Concerto for piano; Concerto for violin; Fantasie for piano and orchestra.* Chamber music: *String quartets, trios, piano quintet.* Many compositions for piano, songs, and choruses. Theoretical works: *Treatise on Harmony* and *Handbook of Musical Form.*

**ARENTS,** ä'rents, ALBERT (1840—). A German-American metallurgist. He was born at Klausthal, Germany, and studied mining engineering there and at Berlin. In 1865 he came to the United States and undertook to treat the lead ores in Hampton Co., Mass. He was metallurgist and mining engineer of a number of enterprises in the Western States, and patented many valuable industrial improvements, including a "siphon-tap" for lead blast furnaces.

**ARENTZEN,** ä'rents-en, KRISTIAN AUGUST EMIL (1823–1900). A Danish poet. He was born at Copenhagen, and after extensive travels he was appointed to the chair of æsthetics in the University of Copenhagen. He published two dramas, *Gunlög Ormetunge* (1852), and *Knud den Hellige* (1853), and a volume of *Digte* (1854, republished as *Ny Digtsamling*, 1867). He is chiefly known for his important critical work, *Baggesen og Oehlenschläger* (8 vols., 1870–78).

**AREOIS,** ä'rā-ō'ēz. The society of the Areois was a famous institution among the natives of the Society Islands (Tahiti), organized for literary, dramatic, and especially religious purposes. The members traveled from place to place, singing, dancing, and representing historical events and scenes in the lives of gods and heroes. They also devoted themselves to erotic pleasures (love adventures and sexual congress of an absolute reality were acted), which has made the *Areois* stand for a sort of artistic sexualism. Upon the women belonging to the society, infanticide was imposed by oath. It represents one of the most remarkable sides of Polynesian life, for which a parallel has to be sought in the European Middle Ages.

**A'REOM'ETER.** See HYDROMETER.

**AR'EOPAGIT'ICA.** A pamphlet advocating unlicensed printing; the greatest prose work of Milton (1644), a plea for freedom of thought.

**AR'EOP'AGUS** (Gk. Ἄρειος πάγος, *Areios pagos*, hill of Ares). A bare, rocky hill to the west of the Acropolis of Athens, about 350 feet high. The ancients explained the name by saying that here Ares had been tried for the murder of Halirrhothius, or that the Amazons (q.v.), the worshipers of Ares, had attacked the Acropolis from this point. Some modern writers prefer to connect it with the Eumenides (q.v.; see also the account of the *Oresteia*, under ÆSCHYLUS; and ORESTES; and the close of the present article) and the bloodguiltiness, which was tried here, and derive the name from Ἀραί, so that the meaning would be 'hill of the curse.' (Consult Frazer, *Pausanias*, ii, 363.) At the south end steps hewn in the rock lead to a series of rock cuttings which cannot now be satisfactorily explained. On the north side, which overlooks the city and is near the deep cleft where the Eumenides were worshiped, seems to have been the place where the court of Areopagus tried cases of willful murder. The Areopagus gave its name to the most venerable court of Athens (Gk. ἡ ἐν Ἀρείῳ πάγῳ βουλή, 'the Council on the Areopagus'). It met in the open air, and accuser and accused stood on platforms hewn from the rock. The Areopagus seems originally to have been the council of nobles, such as surrounds the king in the Homeric poems, and naturally, therefore, the "king" archon (see ARCHON) remained its presiding officer. This council appears to have gradually taken into its hands the entire governing power, since we are told that it appointed all officials, including the archons, who entered the Areopagus at the end of their term of office. The Areopagus exercised the supreme judicial power and could bring to an account any official, so that its indirect influence must have sufficed to control the State. In the code of Draco the Areopagus kept its place as the court for all cases of willful murder, and even under the Solonian Constitution it seems to have preserved its place as a guardian of the laws, with the power of procedure against any official, or even private citizen, whose conduct was an offense against good morals or the well-being of the community. Under Solon, however, it seems to have lost its deliberative functions so that it could no longer take part directly in administration and legislation. Clisthenes seems to have made no formal change in the rights of the Areopagus; but his creation of the Senate of Five Hundred and the power given the popular assembly certainly must have lessened its real influence. It is certain that in 462 B.C. the leaders of the democracy, Ephialtes and Pericles, succeeded in carrying a law which deprived the Areopagus of all those powers by which it exercised a general control over officials and public morals, leaving it only the right of judgment in murder cases, and the oversight of the sacred olive trees of Athena and some sacred lands. In spite of this reduction of its powers, it remained the most venerated body in Athens,

and we find it appointed at times to act for the State, or to conduct investigations of treasonable conduct, as a sort of commission of the popular assembly. In the reforms of Demetrius of Phalerum (317 B.C), the Areopagus seems to have been given once more an oversight over public morals, and especially over offenses against the new sumptuary laws. In Roman times it was, according to Cicero, one of the governing bodies of Athens, and its name appears on decrees with that of the senate and people. Its judicial jurisdiction was also widely extended, and its decisions still commanded great respect. It is doubtful whether the apostle Paul was actually brought before the court of the Areopagus. It seems more probable that his speech was delivered before a body of curious philosophers on the hill of Areopagus, a convenient spot somewhat retired from the confusion of the neighboring market place. In Athenian legend the court was famed as the body which, under the presidency of Athena, acquitted Orestes of the charge, brought against him by the Furies, of bloodguiltiness in murdering his mother, Clytemnestra. The story forms the subject of the *Eumenides* of Æschylus (q.v.). Consult: Philippi, *Areopag und Epheten* (Berlin, 1874); Busolt, *Handbuch* (Nördlingen, 1887); Schömann, *Griechische Alterthumer*, ed. Lipsius (Berlin, 1897); Meier and Schömann, *Der attische Prozess*, ed. Lipsius (Berlin, 1883–87); and Botsford, *The Athenian Constitution* (New York, 1893).

**AREQUIPA**, ä'rā-kē'pȧ. A maritime department of Peru (Map: Peru, C 7). Area, 21,951 square miles. It is mountainous in the east and has a fertile soil, but is sparsely settled. The district is subject to severe volcanic disturbances. Copper, mica, borax, and sulphur are mined in the department. The population was officially estimated in 1896 at 229,007. Capital, Arequipa (q.v.).

**AREQUIPA.** An episcopal city, capital of the department of Arequipa, Peru; situated on the Chile River, 100 miles by rail northeast of the port of Mollendo. Another railroad, which reaches a summit level of 14,460 feet, runs to Puno, on Lake Titicaca, 225 miles to the east. Its situation, on the plateau of Quilca, 7000 feet above sea level, at the foot of the half-extinct volcano Misti, gives Arequipa a very temperate climate. The air is exceedingly dry and the water is impregnated with salts. It is the second city in Peru, is regularly laid out, and has a cathedral, a university, and two national schools. The inhabitants are engaged in the manufacture of jewelry, the cutting of precious stones, and in commerce, the city being the centre of trade for the interior of Peru. Near by is the Arequipa Observatory, a branch of the Harvard College Observatory, at an altitude of 8060 feet. It contains the Bruce Photographic Telescope, the largest instrument of the kind yet constructed, the gift of Miss Catherine W. Bruce of New York. Arequipa was founded in 1540 by Francisco Pizarro, and has ever since been important in the history of Peru, occupying a prominent place in the war for independence. In 1600 the city was almost ruined by an earthquake. In 1868 the city was again subjected to shocks which overthrew nearly all its buildings and killed more than 600 people. Pop., 1889, 30,000; 1896, 35,000; 1908, 35,000 to 40,000.

**AREQUIPA**, or MISTI. A volcanic mountain of the Andes, Peru, about 20,000 feet high. The volcano has been inactive since 1831.

**ARES**, ā'rēz. See MARS.

**AR'ETÆ'US** (Gk. *'Αρεταῖος, Aretaios*). A famous Greek physician and writer of Cappadocia, who flourished in the latter half of the first and the beginning of the second century after Christ. He is considered to rank next to Hippocrates in the skill with which he treated diseases. He was noted for his total want of professional bigotry, and in his accuracy in the detail of symptoms and the diagnosis of disease was superior to most of the ancient physicians. His great work, written in singularly elegant and concise Ionic Greek, is divided into two parts. The first four books treat of the causes and symptoms of acute and chronic diseases; the last four, the cure of the same. They have been translated into various European languages, besides having been frequently edited in the original. The finest edition is the Oxford one of 1723, by J. Wigan. A German translation appeared at Vienna (1790–1802); an English one, by T. F. Reynolds, London, 1837; and there is a Greek and English edition by Dr. F. Adams (London, 1856).

**ARE'TE.** A unique instance among the Greeks of a woman carrying on a philosophic tradition. See ARISTIPPUS.

**AR'ETHU'SA.** See ALPHEUS.

**ARETHUSA BULBO'SA.** A beautiful terrestrial orchid growing in wet bogs of the northern United States. The plant is small, and consists of a slender scape, 6 to 10 inches in height, which arises from a bulb. The lower portion of the scape bears a few green bracts, and the summit is crowned by a brilliant rose-pink flower one to two inches in length. The plant blooms in late spring. For illustration, see Plate of ANEMONE.

**AR'ETIN'IAN SYL'LABLES.** The syllables *ut, re, mi, fa, sol, la,* used by Guido d'Arezzo.

**ARETINO**, ä'rā-tē'nō, CARLO (properly CARLO MARSUPPINI) (c.1399–1453). An Italian humanist. He was born at Arezzo (whence his surname), studied the Latin language and literature at Florence under Giovanni da Ravenna and Greek under Manuel Chrysoloras; and, with the patronage of the Medici, lectured learnedly and successfully on the classics. His first lecture, indeed, seems at once to have established his fame; for on that occasion, we are told, he amazed all by quotations from every known author, Greek or Roman. But it also seems to have begun the quarrel between him and the renowned Filelfo, who eventually, through Medicean hostility, was compelled to withdraw to Siena. He was appointed first apostolic secretary, and became in 1444 chancellor of the Republic of Florence. His writings include translations into Latin of the *Batrachomyomachia* and book i of the *Iliad*. His finely sculptured tomb, one of the finest monuments of the Renaissance, is still to be seen at Florence, in the southern aisle of the church of Santa Croce. Consult Nisard, *Les gladiateurs de la république des lettres aux XV^e^, XVI^e^, et XVII^e^ siècles* (Paris, 1860).

**ARETINO**, GUIDO. See GUIDO D'AREZZO.

**ARETINO**, LEONARDO. See BRUNI.

**ARETINO**, PIETRO (1492–1557). A notorious and profligate Italian author of the sixteenth century, who, apart from his comedies, is interesting chiefly for his colossal and successful

impudence. He was born at Arezzo, the son of a shoemaker, Luca, whose surname is unknown; for Pietro, being ashamed of his origin, assumed that of Aretino. While still young he came to Rome and found favor with Pope Leo X and Cardinal Giulio de Medici, but lost it through writing some licentious sonnets. For a while he frequented the Medicean court, where he attached himself closely to Giovanni de Medici, but after the death of the latter withdrew to Venice, where he soon acquired powerful friends and where he remained almost continually till his death. Aretino has best been summed up as a systematic blackmailer. His letters are an astonishing record of audacity: they show him to have been equally adept in the art of threats and of successful flattery and extorted from many of the greatest figures of the time—even from Francis I and Charles V—rich gifts of jewelry, large sums of money, and in some cases even annuities, which enabled him to lead at Venice a life of lavish opulence. Letters written to him by kings and princes abound in terms of adulation and flattery. He was a remarkably prolific writer in various fields of literature, and he has left dialogues, biographies, sonnets and other poems, comedies, one tragedy, and six volumes of letters. Aside from the tragedy *Orazia*, which was good, judged by contemporary standards, the comedies, of which the principal ones are the *Cortigiana* and *Talanta*, are alone of any merit, and their interest is due mainly to their vivid portrayal of life; but, in the words of Symonds, it is life seen "from the standpoint of the servants' hall." Aretino's greatest strength lay in his satire. There is an edition of *Le commedie e L'Orazia tragedia di Pietro Aretino* (Milan, 1876). Consult: Graf, *Attraverso il Cinquecento* (Turin, 1888); Van Dyke, *Renascence Portraits* (New York, 1905); De Sanctis, *Storia della Letteratura italiana*, ed. by Benedetto Croce (Bari, 1912); Landoni, *Lettere scritte a Pietro Aretino* (Bologna, 1873–74).

**ARETINO,** Spinello. See Spinello Aretino.

**AREZZO,** ȧ-rĕt'sō (ancient Lat. *Arretium*). An episcopal city of Italy, the capital of the province of Arezzo, Tuscany (Map: Italy, F 4). It is beautifully situated on the slope of a hill, 54 miles southeast of Florence and 6 miles from the confluence of the Chiana and the Arno. It has broad streets, impressive buildings, a famous academy of science, a museum and picture gallery, a library, many convents, and excellent mineral springs. Externally, the cathedral, which was begun in the thirteenth century, is unattractive; but the proportions of the interior are pleasing, and the decorations are elaborate and by master hands of several centuries. The church of San Francisco contains some fine fifteenth-century frescoes. The Pieve, begun in the eleventh century on the site of a heathen temple, also contains art treasures. The ancient Arretium was one of the 12 richest and most populous cities in Etruria and excelled in pottery and in copper work. It was a vigorous opponent of Rome in the fourth and third centuries B.C., but later sought aid from Rome against the Gauls. In the Hannibalic War it supported Rome. In the Social War, Sulla sacked it, banished its citizens, and replaced them with his own followers. The fame of the pottery works of Arretium (Arretine Ware: see Archæology) endured throughout Roman times; much ancient pottery has been found there, bearing often reliefs of high artistic value. It was also sacked by the Goths under Totila and restored under Justinian. During the contest of the Guelphs and the Ghibellines in a later age, it became subject to Florence, being defeated in the battle of Campaldino, in which Dante took part. Among celebrated men born here were Mæcenas, the famous patron of letters in the time of the Emperor Augustus; Petrarch; Carlo Aretino (see Aretino, Carlo); Pietro Aretino (see Aretino, Pietro); Guido Aretino (see Guido d' Arezzo); Leonardo Aretino, the historian (see Bruni); Cesalpino, the botanist; Redi, the physician; Pope Julius II; the notorious Marshal d'Ancre (see Ancre); and Vasari, author of *Lives of the Painters*. (See also Spinello Aretino.) The principal manufactures are cloth, silk fabrics, and leather. The country is unusually fertile, and produces grain, wine, oil, and fruit. Pop., 1881, 39,000; 1901 (commune), 44,027; 1911, 47,504.

**ARGÆ'US,** är-jē'ŭs, Mount. See Arjish.

**AR'GALI** (Mongolian name). A mountain sheep, specifically *Ovis ammon*, formerly common to all the mountain ranges of northeastern Asia, but lately killed off in Siberia and restricted to the heights of Mongolia, where it is found near timber line. Its size is that of a large donkey, and it is covered by short, coarse, gray-brown hair, with the short mane and a stripe down the fore legs dark and the rump and under surface of the body white. The massive horns of the ram coil like those of the bighorn (sometimes called American argali) and measure 40 to 48 inches along the curve and 16 or more around the base; the horns of the ewes reach about half of these dimensions. A closely allied species is the nyan, or Tibetan argali (*Ovis hodgsoni*), which is distinguished by a white ruff upon the throat. It frequents the barren and desolate regions of high Tibet. Sportsmen regard these sheep as among the most difficult game to stalk, and good specimens are rare in collections. See Bighorn; and Plate accompanying Sheep.

**AR'GALL,** Sir Samuel (c.1580–1626). An English navigator, and Deputy Governor of the Virginia Colony. In 1609 he was sent to Virginia in charge of a vessel with orders to find a more direct route than that previously followed, and he succeeded in considerably shortening the time ordinarily occupied by the passage. After his arrival, in 1609, he was employed in surveying Chesapeake Bay and a large part of the coast northward to Cape Cod. Returning to Virginia, he took part in the fighting with the Indians, and in 1612 he conducted the negotiations with the chief of a Potomac tribe to whose care the women of the Powhatan tribe had been intrusted during hostilities, by which the English secured possession of Pocahontas, a favorite daughter of the chief, Powhatan, in exchange for a copper kettle. Her marriage to John Rolfe followed soon after, and the troubles with the natives were settled, leaving Argall free to go to sea again. In 1613 he was given command of a powerful war vessel and instructed to keep all intruders out of the territory claimed for England. He sailed to Mount Desert Island, where he found a French Jesuit settlement, which he destroyed, carrying off the settlers to Jamestown as prisoners. French establishments at Port Royal and St. Croix received the same treatment. In 1617 Argall was promoted to be Deputy Governor and Admiral of Virginia. He

conducted affairs in a high-handed fashion, and was accused of engaging in illegal trade, especially with the Spanish settlements in the West Indies. He ignored several peremptory orders to return to England to answer the charges against him, but eventually went back to stand trial. No serious action, however, was taken, probably because of the protection afforded him by the Earl of Warwick, who is supposed to have participated in the profits of Argall's ventures. In 1620 Argall was captain in a fleet which attacked the Algerine pirates in the Mediterranean. A year later he was knighted. In 1625 he was appointed admiral of an Anglo-Dutch fleet of 28 vessels, which took Spanish prizes valued at over £100,000, and later in the same year he commanded the flagship in Cecil's expedition against the Spaniards.

**AR'GAN** (Ar. *arjan*), *Argania sideroxylon*, a species of the family Sapotaceæ. It is a low, spiny evergreen tree, native of the southern parts of Morocco, and bears an ovate drupe the size of a plum, dotted with white, and full of a white milky juice. The Moors extract from the fruit an oil known as "argan oil," which they use with their food.

**ARGAN,** är'gän'. The hypochondriac in Molière's *Le malade imaginaire*, who allows himself to be cozened by apothecaries even to the extent of forcing his daughter to receive the addresses of one of them. He is finally effectively disillusioned and cured by his brother-in-law.

**ARGAND,** är'gand, *Fr. pron.* är'gäN', Aimé (1755–1803). A Swiss mathematician, the inventor of the well-known Argand burner. The chief difficulty that attended the use of lamps as a source of light before Argand introduced his invention consisted in procuring complete combustion of the oil, so as to keep the flame from smoking. Argand's improvement consisted in making the wick ring-shaped. The flame procured by means of a circular wick has naturally the form of a hollow cylinder, with a current of air ascending through the inside, so that the burning surface is doubled. Argand's younger brother accidentally discovered the effect of the glass chimney, by which the flame is steadied, a draught created, and thus the greatest possible amount of light produced. The Argand burner has been extensively used in gas lighting.

**ARGAND,** Jean Robert (1768–1822). One of the inventors of the geometric representation of complex numbers. His *Essai sur une manière de représenter les quantités imaginaires dans les constructions géométriques* was published at Paris in 1806, but lay forgotten for 60 years. Meanwhile Gauss (1831) had made the complex numbers and their geometric representation familiar to mathematicians. It is now known that Argand was anticipated by Wessel (1797) and Kühn (1750). See Complex Numbers.

**ARGANTE,** är'gänt'. 1. A witty portrait in Molière's gallery of dupes—the father who, in *Les fourberies de Scapin*, is trickily persuaded by Scapin to give up his own plans in favor of those of his son and daughter. 2. A giantess typifying Licentiousness in the *Faerie Queene*, by Spenser.

**ARGANTES,** är-gän'tēz. A fierce Circassian, the bravest of the infidel warriors, in Tasso's *Jerusalem Delivered*.

**ARGAO,** är-gä'ō. A seaport on the southeast coast of the island of Cebu, Philippines, situated about 33 miles southwest of the city of Cebu. Pop., 1903, 35,448.

**ARGEI.** See Roman Festivals.

**ARGEL,** är'gĕl, or **ARGHEL** (Syrian), *Solenostemma argel*. A plant of the family Asclepiadaceæ, a native of Arabia and of the north of Africa, deserving of notice because of the frequent use of its leaves for the adulteration of senna. They are lanceolate and leathery and may be readily distinguished from genuine senna leaves by their texture, their being downy, their greater heaviness, the comparative absence of veins, and the symmetry of their sides, the sides of the true senna leaves being unequal. They are acrid and cause sickness and griping; but a difference of opinion prevails as to their possessing purgative properties.

**ARGELANDER,** är'ge-län'dĕr, Friedrich Wilhelm August (1799–1875). One of the most eminent German astronomers of the nineteenth century. He was born at Memel, Prussia. He studied at Königsberg, where the political sciences first attracted him; but he was subsequently drawn away to astronomy by the lectures of Bessel, by whom he was employed to make calculations and observations. In 1820 he was appointed assistant to Bessel in the Königsberg Observatory, and in 1823 succeeded Walbeck as astronomer at the observatory of Åbo, in Finland. Here he began a series of observations on the fixed stars which have a perceptible "proper motion." His studies were unfortunately interrupted by a fire which destroyed the observatory; but after a time he resumed them in a new observatory at Helsingfors and published a catalogue of not less than 560 stars having "proper motions." This contained the results of his observations at Åbo and received from the Academy of St. Petersburg the Demidoff Prize. In 1837 he was invited to fill the chair of astronomy at the University of Bonn. Argelander was long engaged in a series of observations on the changes of light in variable stars, and he also added to our knowledge of the progressive motion of the solar system in space. Argelander's works include: *Observationes Astronomicæ in Speculæ Universitatis Fennico Factæ* (3 vols., Helsingfors, 1830–32); *Neue Uranometrie* (Berlin, 1843), containing 18 celestial charts of fixed stars seen with the naked eye; *Mittlere Oerter von 33,811 Sternen* (Bonn, 1867); and a few others of considerable importance. His greatest work, however, is the *Atlas des nördlichen gestirnten Himmels* (Bonn, 1857), with a *Sternverzeichnis* (Bonn, 1859–62, vols. iii–v of the *Astronomische Beobachtungen auf der Sternwarte zu Bonn*). This work contains an enormous number of observations carried out by Argelander and his assistants during the nine years from 1852 to 1861.

**AR'GEMO'NE** (Lat. an herb, Gk. ἀργεμώνη, *argemōnē*, a kind of poppy). A genus of plants of about 10 species belonging to the family Papaveraceæ distinguished by four to six petals, three to seven radiating concave stigmas, and an oblong capsule, opening by valves at the apex. *Argemone mexicana*, sometimes called Mexican poppy and prickly poppy, is an annual herbaceous plant one to two feet high, with large yellow flowers, and sessile, waved and sinuated, spiny leaves, variegated with white. It is a native of Mexico and of the southern parts of the United States and is now also common in many tropical and sub-tropical coun-

tries, in which it has been naturalized. In parts of Australia it has become a troublesome weed. Its seeds are narcotic, purgative, and diuretic, exhibiting in a strong degree those qualities of the family of which the seeds of the poppy are devoid. They are used in the West Indies as a substitute for ipecacuanha, also instead of opium; and the juice of the plant is employed as a remedy for ophthalmia. This plant is not infrequently to be seen in flower borders in Great Britain and elsewhere; but in the northern parts, at least, the seed is generally sown in a hotbed. *Argemone intermedia*, a similar species with white petals and a capsule armed with stout spines, is common from Kansas and Nebraska southward and westward. *Argemone grandiflora*, a Mexican species, has large white flowers, and the plant is almost devoid of prickles. All these plants are occasionally met with in gardens.

**AR'GENIS.** An allegorical romance in Latin by John Barclay published in 1621. It purports to narrate the history of a war waged by Lycogenes, a Sicilian rebel, and Poliarchus, a prince of Gaul, for the hand of the daughter of Meliander, King of Sicily. But under this thin, figurative veneer one can easily trace a history of contemporary happenings. Poliarchus represents Henry IV, Hyanisbe, Queen Elizabeth, and Radirobanes, Philip II. The book has exerted not a little literary influence. Fénelon's *Télémaque* is modeled after it. It was also the favorite work of Cardinal Richelieu, suggesting to him some of his political moves. Cowper said of it that it was "the most amusing romance that ever was written."

**ARGENS,** är'zhän', JEAN BAPTISTE DE BOYER, MARQUIS D' (1704–71). A French philosophical writer, born at Aix, in Provence. His *Lettres chinoises* (1739–42), *Lettres cabalistiques* (1741), and widely read *Lettres juives* (1738–42) attracted the notice of Frederick II, and their author was invited to Potsdam. In 1744 he was made director of fine arts in the Academy of Berlin with a large salary. Soon he was the friend and daily companion of the King, who liked exceedingly his frank and vivacious character. Frederick's poems were edited by Argens in 1760. When almost 60, he married an actress, without Frederick's permission. Deprived of his pension, he returned to Provence and died at Toulon. Among his other numerous writings should be mentioned *Mémoires secrets de la république de lettres* (1744), *Histoire de l'esprit humain* (14 vols., 1765–68), and *Réflections critiques sur les écoles de peinture* (1752). In 1763 his principal works were published together in 24 volumes. *Philosophical Dissertations on the Uncertainty of Human Knowledge*, a London edition, appeared in 1753.

**ARGENSOLA,** är'hĕn-sō'lȧ, LUPERCIO LEONARDO DE (1559–1613) and BARTOLOMÉ LEONARDO DE (1562–1631). Two Spanish poets, sometimes called, and not entirely without reason, the "Spanish Horaces." They were born at Barbastro, in Aragon, the elder brother Dec. 14, 1559, the younger Aug. 26, 1562. Both studied at the University of Huesca, and both later enjoyed the patronage of Maria of Austria, widow of the Emperor Maximilian II, who made Lupercio her secretary and Bartolomé her chaplain. The former was subsequently appointed, by Philip III, historiographer of Aragon. Bartolomé was commissioned by the Conde de Lemos, then president of the Indian Council, to write the *Conquista de las Islas Molucas* (1609); and when that nobleman became Viceroy of Naples, both brothers, who had meanwhile acquired fame as poets, were included in his suite, thereby arousing the anger of Cervantes, who had hoped to obtain a like honor. Lupercio died in Naples, in 1613, while filling the office of Secretary of State. Bartolomé succeeded his brother as historiographer of Aragon. He returned to Spain and busied himself till his death in 1631 with Lupercio's unfinished work, a continuation of Zurita's *Annals of Aragon*. Only the first part, which deals with the years 1516–20, was completed, every detail being treated with wearisome minuteness. The collected poems of the two brothers were first published posthumously by Lupercio's son, under the title of *Rimas* (Saragossa, 1634), and received from no less a personage than Lope de Vega the indorsement that the authors "had come from Aragon to reform among our poets the Castilian language." Although an overstatement, due to Lope's aversion to Gongorism in all its forms, this verdict indicates the real merit of their verse. They are both models of correct form and pure idiom, with the Horatian model and the classic standard ever before them, yet their influence on the literature of their country was, on the whole, small. Lupercio is also remembered as a dramatist whom Cervantes pronounced almost equal to himself; but of his three known plays, one, the *Filis*, is lost, while his *Isabela* and *Alejandra* show little to justify Cervantes's praise. The best edition of the *Obras sueltas* of both brothers is that edited by the Conde de la Viñaza (2 vols., Madrid, 1889, in the *Colección de escritores castellanos*), which includes the plays and shorter prose writings. Consult also J. P. W. Crawford, "Notes on the Tragedies of Lupercio Leonardo de Argensola," in the *Romanic Review*, vol. iv (1913).

**ARGENSON,** är'zhän'sōn', MARC ANTOINE RENÉ DE VOYER, MARQUIS DE PAULMY (1722–87). A French diplomat and author, son of Louis XV's Minister of Foreign Affairs. He was Envoy to Poland, Switzerland, and Venice; a member of the Royal Academy, and gathered a library of about 100,000 volumes, which was purchased by the Comte d'Artois in 1785 and became the nucleus of the Bibliothèque de l'Arsenal. He was editor of 40 volumes of the *Universal Bibliography of Romance*, in which are some novels of his own.

**ARGENSON,** MARC PIERRE DE VOYER, COUNT D' (1696–1764). A celebrated French statesman, brother of René Louis de Voyer d'Argenson (q.v.). After holding a number of inferior offices, he succeeded M. de Breteuil in the War Office in 1742. On the death of Cardinal Fleury in the following year, the whole care of the war then raging devolved upon him. He found matters in the most deplorable condition. The French troops, decimated by sword and disease, were in full retreat across the Rhine; the Austrians already swarmed in Alsace and Lorraine, and the very political existence of France was imperiled; but Argenson, by his vigor and lucky choice of generals, changed the fortunes of war in the course of one year. After the victories of Fontenoy and Louffeld, and the capture of Bergen-op-Zoom, peace was secured by the famous Treaty of Aix-la-Chapelle, signed in 1748. Argenson, however, did not remain inactive; he introduced reforms in the army, established the

*Ecole Militaire* in 1751, and by various measures kept alive the military spirit of the nation. He was an illustrious patron of literature. Diderot and D'Alembert dedicated to him their great *Encyclopédie;* and to Voltaire, whose fellow-student he had been, he furnished materials for his *Siècle de Louis XIV.* In 1757 he was exiled to his estate, it is supposed by the machinations of Madame Pompadour. On her death he returned to Paris.

**ARGENSON,** Marc René, Marquis d' (1652–1721). A member of an ancient French family possessed of a domain in what is now the department of Indre-et-Loire. Passing through many minor offices, he was made Keeper of the Seal in 1718, and Minister of State in 1720. He resigned the same year owing to the friction caused by John Law's financial schemes. He was a member of the French Academy and honorary member of the Academy of Sciences.

**ARGENSON,** Marc René de Voyer d' (1771–1842). A grandson of Marc Pierre d'Argenson. A French soldier and statesman. Though he was an aristocrat by birth and possessed immense wealth, he embraced the cause of the Revolution and served as Lafayette's adjutant till the excesses of 1792 drove him from public life. In 1809, while prefect of Antwerp (then Deux-Nèthes), he took part in the expulsion of the English from Walcheren. In 1813 he resigned rather than unjustly confiscate the property of the mayor at the order of the French ministry. He was elected deputy for Belfort in the Hundred Days and reelected after the second Restoration. In 1830 he appeared in the Chamber to represent Strassburg, joined the "Society of the Rights of Man," subsidized heavily the newspapers of the Opposition, and by voice and pen fought vigorously the July monarchy. He was brought to trial for publishing a radical tract; and, though acquitted, became discouraged, retired to his estates, and spent the remainder of his life in an endeavor to better rural conditions.

**ARGENSON,** René Louis de Voyer, Marquis d' (1694–1757). Minister of Foreign Affairs for Louis XV from 1744 to 1747, when he was forced to resign on account of the intrigues of Spain, whose policy he had frustrated in his negotiations with Italy. He was more of a student and idealist than a diplomat, and his ministry was not very successful. After his retirement he devoted himself to literature. He was a profound student of political science, and wrote, among other works, *Considérations sur le gouvernement ancien et présent de la France* (Amsterdam, 1764). His journal and memoirs, in nine volumes, were published at Paris, 1861–67, and at the same place in 1898, *La France au milieu du XVIII^e^ siècle.* Consult Ogle, *The Marquis d'Argenson* (Oxford, 1893).

**AR'GENT** (Fr. silver). An archaic or poetic term for silver or anything as white as silver; especially used in heraldry to designate the silver of a coat of arms or merely the white color of any part of one's armor.

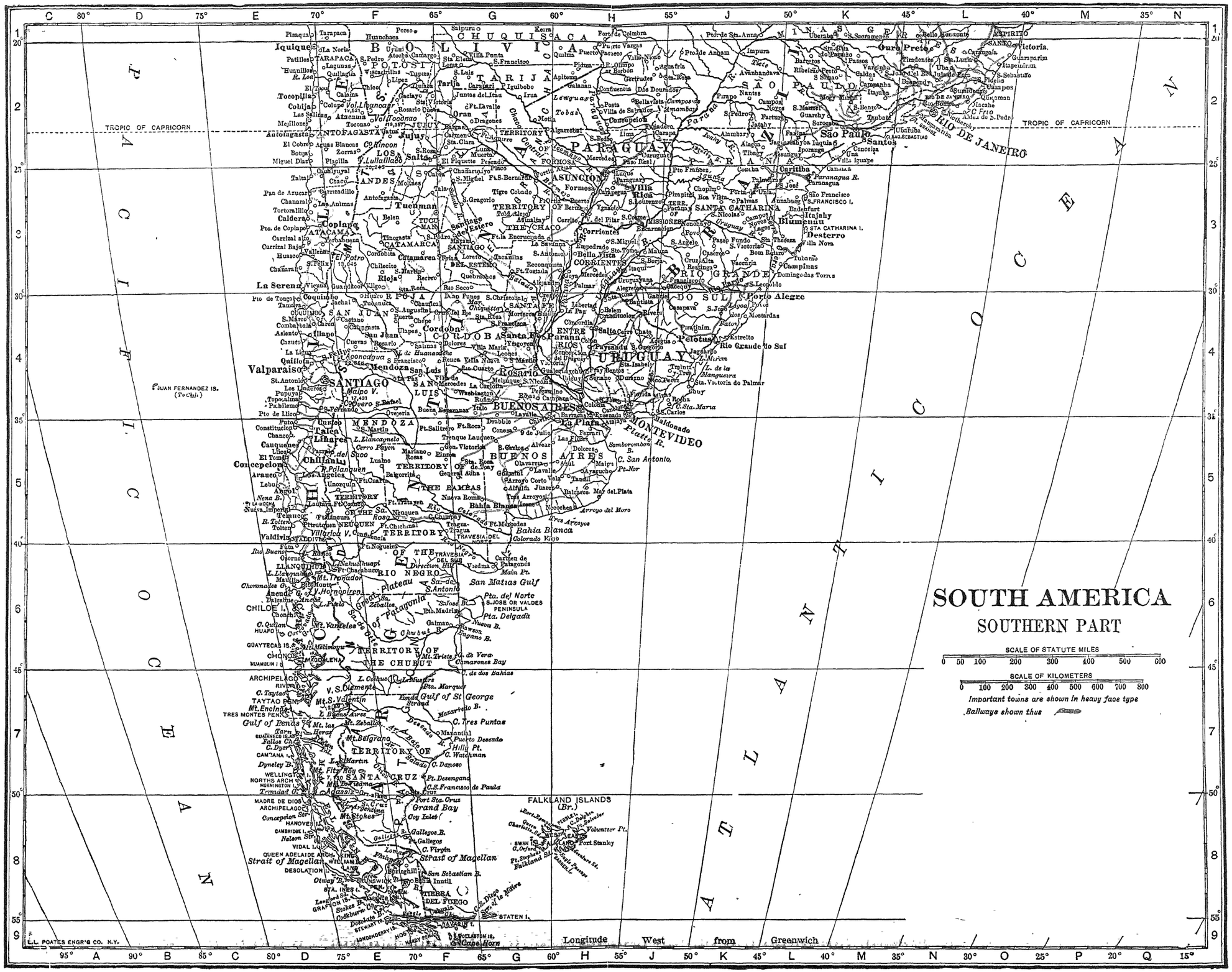
**ARGEN'TA.** A city in Pulaski Co., Ark., opposite Little Rock, on the Arkansas River, and on the St. Louis Southwestern, the St. Louis, Iron Mountain, and Southern, and the Chicago, Rock Island, and Pacific railroads (Map: Arkansas, C 3). The city has a railroad hospital, St. Joseph's Orphanage, Fort Logan H. Roots, and two parks. Its industries include extensive railroad shops, four cotton oil mills, four compresses, a stave factory, an excelsior plant, a cooperage, and boiler and iron works. Natural gas provides a low-priced fuel for manufacturing and domestic purposes. The surrounding region is agricultural and yields corn, rice, and all small grain. The electric light plant is owned by the municipality. Pop., 1900, about 4500; 1910, 11,138.

**ARGENTEUIL,** ar'zhaN'tē'y'. A town in the department of Seine-et-Oise, France, 7 miles northwest of Paris (Map: Paris and vicinity). The surrounding region is noted for producing excellent asparagus. The town has manufactures of files, pasteboards, watches, and alcohol. It was built up about a nunnery, now in ruins, which was founded by Charlemagne in the seventh century. His daughter, Theodada, and Héloise, beloved of Abélard, were abbesses. Pop., 1901, 17,375; 1911, 24,282.

**ARGEN'TEUS CO'DEX.** See Ulfilas.

**ARGENTINA,** är'jĕn-tē'nȧ; *Sp. pron.* är'-hĕn-tē'nȧ, or Argentine Republic (officially, República Argentina) (from Lat. *argentum,* silver; cf. the name Río de la Plata, Sp., River of Silver). A federal republic, next to Brazil the largest state in South America (Map: South America, C 6). In the beginning it was styled "the United Provinces of the Río de la Plata." It is included between lat. 21° 55′ and 55° 2′ 30″ south, long. 53° 40′ and 73° 17′ 30″ west, and is bounded on the north by Bolivia and Paraguay; on the east by Paraguay, Brazil, Uruguay, and the Atlantic Ocean; on the south by the Atlantic and Chile; and on the west by Chile, the watershed indicated by the highest summits of the Andes separating the two countries. It forms a blunted wedge-shaped area about 2200 miles long, with a width of nearly 1000 miles at the north and less than 200 miles near the Strait of Magellan. A number of islands are included; the Falkland Islands, off the Atlantic Coast, which were at one time claimed by the republic, are held by Great Britain. The total area is 1,083,596 square miles, divided between 14 organized provinces, 10 territories, and the Federal Capital district of 72 square miles. Pop., 1921 (est.), 8,698,516.

**Topography.** The surface is diversified by the Andean Cordilleras on the western border and by the interior highlands; but the greater part of the area is a flat plain sloping gently toward the Atlantic Ocean. The Andes system in the northwest is a broad plateau, broken into parallel or slightly diverging ridges which reach well to the east of the Chilean frontier, and occupy large areas in the provinces of Jujuy, Salta, Tucumán, Catamarca, Rioja, and San Juan. Above the plateau rise numerous crests to a height of over 17,000 feet, attaining extreme elevations in Aconcagua (23,393), Mercedario (21,982), Famatina (20,340), and Tupungato (22,329). In the western province of Mendoza the Andes contract laterally, and gradually fall off in height toward the south, where they end in the highlands of Tierra del Fuego. East of the Cordilleras, the most notable elevations are the north and south ridge of the Sierra de Córdoba, on the western boundary of the province of Córdoba; the Tandil and Ventana Highlands, in the province of Buenos Aires; and the continuation of the mountain range of Lower Brazil, in the territory of Misiones. These independent mountain ranges, however, are of no great areal or topographic importance; the entire region eastward from the base of the Andean plateau is generally flat or slightly undulating, and falls gradually from an elevation of about


SOUTH AMERICA
SOUTHERN PART
SCALE OF STATUTE MILES
0 50 100 200 300 400 500 600
SCALE OF KILOMETERS
0 100 200 300 400 500 600 700 800
Important towns are shown in heavy face type
Railways shown thus
TROPIC OF CAPRICORN
PACIFIC OCEAN
ATLANTIC OCEAN
CHILE
BOLIVIA
PARAGUAY
URUGUAY
ARGENTINE REPUBLIC
BRAZIL
FALKLAND ISLANDS (Br.)
Longitude West from Greenwich
L.L. POATES ENGR'G CO. N.Y.

2000 feet to, or nearly to, the level of the sea. That part of the plain north of the Río Salado (affluent of the Paraná) is called the "Gran Chaco" (great hunting ground), and the northern part contains extensive forests. North of the Río Negro, in Central Argentina, are the extensive characteristic pampas, monotonous treeless stretches of apparently level ground covered with grass during the wet season. Northward the pampas graduate into more forested country, and are also marked by a large interior drainage system and by saline swamps, while to the south they merge into the desolate, dry steppes of Patagonia, which are disposed at an elevation ranging from 200 feet at the base of the Andes to 500 feet or less on the coast. Between the Río Paraná and the Río Uruguay are the provinces of Corrientes and Entre Ríos, which are generally low, the latter province, however, containing a small area of hills in the west.

**Hydrography.** Aside from a few inclosed basins in the interior, the entire area is drained by easterly flowing rivers into the Atlantic. The great system of the Río de la Plata, formed by the confluence of the Uruguay and the Paraná, belongs only partly to Argentina, as both its branches rise in the interior of Brazil and for a large part of their course flow along the frontiers of Brazil, Paraguay, and Uruguay. The Paraná is of great importance to Argentina as a commercial highway. With the Paraguay it drains the Gran Chaco, through the channels of the Pilcomayo, Bermejo, and Salado, and also the northern pampas, where in past times there were several important tributaries that are now represented by smaller streams with intermittent flow. The Paraná is navigable by steamers for a distance of about 1200 miles and by light-draught boats for nearly its whole length. From the confluence of the Paraguay to the sea the fall amounts only to about 225 feet, so that a slight depression would separate the system of the Río de la Plata into three independent branches—the Paraná, the Paraguay, and the Uruguay. In the central provinces of Argentina, between the Río Salado on the north and the Río Colorado on the south, there is an area of inclosed drainage, with extensive saline marshes, which deposit alkaline salts during the dry season. South Argentina is drained by the Colorado and Negro, both rising on the slopes of the Andes. The drainage basin of the Colorado formerly covered a much larger territory, as the provinces of San Juan, San Luis, and Mendoza were drained by a northern tributary that now ends in a swampy reservoir. Patagonia has several large streams, including the Chubut, Deseado, Salado, and Chico, which receive their water supplies from the slopes of the Andes, where there are numerous glacial lakes. See PLATA, RÍO DE LA; PARANÁ; PARAGUAY RIVER; COLORADO, RÍO; SALADO, RÍO.

**Climate.** The northern part of Argentina projects well within the equatorial hot belt, while the central and southern parts extend through the south temperate zone. The peculiar location of Argentina, with oceanic conditions on the east and high mountains on the west, makes its climatic details very dependent on the direction of the winds. The northern section lies within the region of prevailing east winds, which convey inland the warm, moist air from the Atlantic Ocean, and cause a very uniform temperature, with heavy precipitation on the coast, but decreasing in amount with progress inland. South of the Río de la Plata the west and northwest winds of middle latitudes prevail, and these convey across the narrow territory the air from the Pacific Ocean, which has been deprived of most of its moisture on the windward slopes of the Chilean Andes. Thus the air becomes drier, and the precipitation decreases with approach toward the Atlantic coast. The monsoon effects considerably modify these general conditions, so that for the northern and more important half of Argentina, in winter, northerly winds are very common.

The temperature decreases with increase of latitude, and varies in the annual average from 70° F. at the north to less than 45° F. at the south. In the north the temperatures range from a maximum of 105° F. to a minimum of 30° F.; the hottest month averages about 80° F., and the coldest month about 55° F. Toward the middle of Argentina the hottest month averages only 75° F. and the coldest a little less than 50° F., and at the extreme south, in Tierra del Fuego, the temperatures are continuously low, snow falling at all times. There is in general a great difference between the day and night temperatures; but the intense cold waves of the middle latitudes of the continents of the northern hemisphere are entirely lacking. In general, the rainy season is in summer, with a winter season that is dry, even to the utter lack of rain in the interior. Three rain belts lying nearly parallel to the Andes are noticeable; in the extreme northeast the rainfall is moderately heavy, from 50 to 70 inches. To the west of this there is a zone of moderately light rainfall, extending as far south as the mouth of the Río de la Plata, where the annual average is about 30 inches. Still farther west there is a rapid decrease to the Andean slopes, some areas having no more than two inches. On the pampas the weather is variable, changes from the cool, dry south winds to the moist, hot north winds frequently occurring with great suddenness. The former winds, which sometimes blow with stormy violence, are called "pamperos." They come with little warning and are sometimes of day-long continuance. The moist, hot wind from the north, called "zonda" (somewhat similar to the sirocco), causes intense discomfort to the inhabitants. The dry zonda of the east side of the Andes region is of Föhn character.

**Flora.** There is great variation in the abundance and character of the vegetation, corresponding to the great variation in latitude, altitude and topographic conditions. In the north and northeast are found tropical woodlands, to the south and west of which are scattered forests containing most of the species usual in warm temperate zones. The slopes of the Andes are well wooded, especially with thorny and shrubby plants, as are the banks of the Paraná and the rivers flowing from the west into the Paraguay, although the trees do not attain great size. Palms are a distinctive feature of the base of the Sierra de Córdoba and of the northwestern foothills. The pampas, in the wet season, are covered with clover and thistles, or with tall grass and flowers, gay verbenas, geraniums, etc.; but here, as well as on the Gran Chaco, there is little to form thickets, except mimosas and cacti. The algarroba, a shrub resembling a honey locust, is widely distributed; it is used for fence posts; from the pulp of the pod are made a kind of flour, and, by fermentation, an intoxicating liquor called chica. Patagonia has herbs,

shrubs, cacti, some tufty grass, brambles, and copse; but it is almost treeless, except in the south, and even there but four species of trees are found, two of them being beeches. Among the indigenous trees and plants are the quince, aloe, coca, cinchona, maté (or Paraguay tea), manioc; the prickly pear, with edible fruit; the *Cactus foliosus*, on which the cochineal insect feeds, and a shrub harboring an insect yielding a handsome green dye. The apple tree, introduced from Chile by the Indians, flourishes in the southwestern provinces; the grape is extensively grown in the western province of Rioja, San Juan, and Mendoza; the province of Salta is famed for its bananas and coffee; and the peach, fig, orange, and walnut are grown in many parts. The scarcity of wood in some provinces compels the use of dry thistles and peach-tree cuttings for fuel.

**Fauna.** The larger wild animals, found mainly in the northern forests, are the jaguar, puma, ocelot, ant-eater, tapir, sloth, monkey, and peccary. The pampas and plains are inhabited by deer, wildcats, wild dogs, pumas, skunks, armadillos, the red wolves, foxes, and several burrowing quadrupeds, notably the viscacha. The guanaco, vicuña, and llama range from the mountains to the plains; the capybara and coypu frequent the rivers; the condor, vulture, the *Rhea americana* (ostrich) range north of the Río Negro, and the *Rhea Darwinia*, south of it. Several species of game birds, and birds of prey, flamingos, and water fowl of many kinds, parrots, humming birds, and other birds of gay plumage are seen in the forested regions or on the open plains, where bird life greatly flourishes. There are several varieties of reptiles in Argentina; boas and rattlesnakes occur in the north, together with iguanas, alligators, and turtles. Spiders also and mosquitos of great size, destructive locusts and ants, and chigoes abound. Fish are very numerous in the coast and inland waters. Seals, sea lions, and sea elephants are captured along the coast, and the rivers supply many edible fish. Most interesting fossil remains are found in different parts of the republic, a large number of species having been obtained, among them the megatherium, toxodon, glyptodon, and gigantic ratite birds.

**Geology and Mineral Resources.** The interior highlands have usually a granitic core, overlaid by Paleozoic formations, while the Andean system is largely composed of Mesozoic strata, broken through by igneous rocks and covered by extensive volcanic sheets. The pampas are made up of Tertiary sandstone and limestone with sandy or clayey material on the surface. In Patagonia the northwest and southeast ridges are denuded remnants of former mountain ranges and rise out of layers of coarse gravel that cover the region to a depth of 50 feet or more. The gravel consists of granite, gneiss, and schist, and has been derived by disintegration and glacial action from the underlying formations. Large areas are also occupied by sand dunes that shift their position with the winds. The region of the Andes was once the scene of enormous volcanic development, when streams of lava flowed down the slopes and spread out over the adjacent plains in the form of thick and extensive sheets. The lower stretches of the rivers in Argentina are bordered by recent deposits of alluvium. The mineral resources of the country have received but little attention as yet, although they are extensive and include a large variety of ores and minerals. Gold is found in the Andes and in the mountains of San Luis, coal in Mendoza and Tierra del Fuego, marble in the Sierra de Córdoba, while copper, lead, silver, iron ores, and sodium salts occur at numerous localities. The output of silver annually exceeds $200,000 in value. The annual gold product amounts to about $10,000. Mica is mined in the mountainous part of Córdoba, and the product is shipped to European countries. Some petroleum is obtained in Neuquén territory.

**Agriculture.** This is naturally the most important industry in a country so rich in land and so sparsely settled as Argentina. The estimated area under cultivation in 1910 was 20,367,082 hectares (1 hectare=2.47 acres), or about 6.8 per cent of the total area of the country. In 1895 the cultivated area was 4,892,004 hectares; in 1888, 2,459,120; and in 1872, 580,008, the latter figure representing about one thirty-fifth of the agricultural area of 1910; and the 1910 area shows an increase of 316 per cent over that of 1895. During the first decade of the twentieth century Argentina took her place among the world's greatest grain-producing countries.

In 1895, at the time of the last census, there were more than 180,000 farms in Argentina, of which 60 per cent were cultivated by their owners, 30 per cent by tenants paying rent, and 8 per cent by persons working for a share of the crop. Although there are no statistics to show the growth of each of these groups, it is a matter of common observation that the number of farmers owning their land is increasing, as free land is abundant and its acquisition extremely easy. Renting for a share of the crop is the first step on the part of the agricultural laborer toward becoming a landowner. Land being abundant and population sparse, labor is naturally well rewarded; so that a laborer often receives from one-fourth to one-half of the crop, the proprietor furnishing land, implements, and seeds, as well as a house and food for the laborer and his family. Under these conditions it takes the laborer only a few years to acquire land of his own. In 15 out of the 23 provinces and territories for which there are figures in the two censuses of the country, the number of farms increased from 43,746 in 1888 to 107,274 in 1895. The average size of farms is about 125 acres, the number of larger plantations and of farms of smaller area being inconsiderable.

The rapid increase in the cultivated area is to a great extent due to European immigration, the newcomers settling in colonies, living in accordance with their own customs, and using their own methods of cultivation. The first colony thus founded consisted of Swiss peasants, who came to Argentina in 1856; in 1874 there were 32 colonies, tilling 12,900 acres; in 1884 the number of colonies increased to 85, the area under cultivation to 86,000 acres; in 1895 the total area under cultivation was 12,083,000 acres. Various nationalities are represented in these colonies, including Italians, Russian and Rumanian Jews, and Boers. The wonderfully rapid growth of colonies is explained by the very liberal immigration laws of the republic, alluring inducements being held out to immigrants, who receive in some provinces large tracts of land and provisions and implements.

The most important crop in Argentina, from a commercial point of view, is wheat, maize and

flax ranking next. Barley, oats, potatoes, tobacco, and other European crops are also extensively raised. Sugar cane is cultivated in the northeast with considerable success, and the cultivation of cotton has been introduced with fairly satisfactory results; the Louisiana variety seems to thrive best, the average return being one ton per acre. The fruits raised are oranges, olives, figs, grapes, and dates, as well as apples, pears, and plums. Silk-worm culture, for which the climate seems to be splendidly adapted, also receives considerable attention. The following figures illustrate the growth of the agricultural industry in Argentina: In 1888 the area devoted to the cultivation of wheat was 815,438 hectares; in 1895 it was 2,049,683; in 1910, 6,253,180. The area devoted to the cultivation of corn in the corresponding years was 801,588, 1,244,184, and 3,215,350 hectares, respectively. The area under linseed increased from 387,324 hectares in 1895 to 1,503,820 in 1910. In the two latter years oats increased from 38,624 hectares to 801,370 and alfalfa from 713,091 to 5,400,580. Notable as these increases are, they indicate only the early stages of the expansive movement of Argentine agriculture. The harvest of 1910 (planted in 1909) showed 3,565,556 metric tons of wheat from 5,354,067 hectares, 716,615 tons of linseed from 1,276,355 hectares, and 529,306 tons of oats from 503,306 hectares. The following is the estimated yield in 1912: Wheat, 4,523,000 metric tons; linseed, 572,000; oats, 1,004,000; corn, 7,515,000; alfalfa, 4,038,000.

The following are the chief wheat-raising provinces, with their production in metric tons in 1910 and 1912 and the estimated value in pesos gold of the crop in the latter year:

| | 1910 | 1912 | 1912 |
|---|---|---|---|
| | Tons | Tons | Pesos |
| Buenos Aires | 1,340,299 | 1,803,000 | 66,711,000 |
| Córdoba | 1,240,528 | 1,200,000 | 44,400,000 |
| Santa Fé | 470,007 | 600,000 | 24,420,000 |
| Pampa Territory | 300,214 | 560,000 | 20,720,000 |
| Entre Ríos | 154,508 | 215,000 | 7,955,000 |

The estimated value of the total agricultural (and forest) production in 1912 was 672,912,190 pesos gold, of which 230,320,367 pesos was credited to the province of Buenos Aires, 138,187,150 to Santa Fé, 100,324,570 to Córdoba, 33,438,940 to Entre Ríos, and 28,841,620 to Pampa territory. There is a continually increasing area planted to sugar cane, tobacco, and the vine.

*Stock raising* is only less important than agriculture. The following table shows the number of various kinds of animals reported at the first and second censuses and the live-stock census of 1908:

| | 1888 | 1895 | 1908 |
|---|---|---|---|
| Cattle | 21,961,657 | 21,701,526 | 29,116,625 |
| Horses | 4,234,032 | 4,446,859 | 7,531,376 |
| Asses and Mules | 417,494 | 483,369 | 750,125 |
| Sheep | 66,706,097 | 74,379,562 | 67,211,754 |
| Swine | 393,758 | 652,766 | 1,403,591 |
| Goats | 1,894,386 | 2,748,860 | 3,945,086 |

As compared with the United States, Argentina has about half as many cattle and about 15,000,000 more sheep; in the United States the 1910 census showed 61,803,866 cattle and 52,447,861 sheep. The estimated value of the total stock-raising products in 1912 was 394,917,922 pesos gold; of this sum the share of Buenos Aires province was 183,319,391 pesos, Entre Ríos 46,961,095, Córdoba 35,875,753, Santa Fé 35,034,437, Corrientes 19,371,037, and Pampa territory 8,104,931. The wool clip may be fairly judged from the export, which amounted in 1885 to 128,393 metric tons; in 1895, 201,353 tons; in 1905, 191,007 tons, and in 1910, 150,599 tons. Meat exports are shown in the section *Commerce*. The production of butter fell from 8,835,039 kilos in 1903 to 7,151,647 kilos in 1909, while the cheese output advanced from 1,187,998 kilos to 3,084,261 kilos. The greater part of the butter is produced in the province and city, and most of the cheese in the province, of Buenos Aires.

**Manufactures.** The manufacturing industry of Argentina has increased rapidly during recent years. Much foreign capital is invested in the more important industries, such as electric light and power plants, flour and lumber mills, boot and shoe factories, etc., and many foreigners are employed in the operation of the factories. The census of 1895 reported 24,124 manufacturing establishments, with 219,548 employees and an investment of capital amounting to 217,390,507 pesos gold. In 1910 the number of industrial establishments was 31,988, with 329,490 employees, capital amounting to 320,139,099 pesos and a total annual output of 540,121,646 pesos.

The manufacture of food products is foremost among the industries. In 1910 the number of establishments of the principal industries and their capital was as follows: 330 flour mills, capital 17,891,148 pesos; 8 meat packing establishments, 13,700,268 pesos: 38 sugar mills, 34,341,650 pesos, 3409 wineries, 28,764,872 pesos; 2403 boot and shoe factories, 7,920,903 pesos; 24 breweries, 13,103,082 pesos; 3891 woodworking establishments, 13,968,527 pesos. In 1912, 322 flour mills (270 in operation) produced 840,118 tons of flour and 360,990 tons of subproducts; 8 meat packing houses manufactured for export products valued at 49,491,107 pesos; 43 sugar mills (37 working) had an output of 147,248 tons of sugar, valued at over 19,000,000 pesos; 24 breweries produced 123,100,000 litres of beer. In 1913, 3653 wineries (7283 working) elaborated 732,178,245 kilos of grapes into 500,011,042 litres of wine, valued at 42,504,000 pesos.

The development of Argentine industry has been in those branches of manufacture in which the natural products of the country can be converted into more valuable finished or half-finished products. As a consequence, the country is being gradually relieved of the necessity of paying a tribute to foreign nations for articles of prime necessity, and employment is provided in the country for a large and steadily increasing number of people. The growth of the sugar-refining industry is a case in point. Previous to 1870 the country imported annually some 22,000 tons of sugar and hardly produced 1000 tons at home; in 1905 the home product rose to 137,095 tons and over 14,000 tons were exported. After falling to 127,322 tons in 1908, the output rose to about 160,000 tons in 1911. Among industries carried on on a large scale, the manufacture of gas should be mentioned. It is almost exclusively in foreign hands (largely English), and in 1910 there was invested in it a capital of 20,376,598 pesos. Electric lighting and power plants have been greatly developed recently and represented an investment of 21,445,094 pesos in 1910. The more distinctive native manufactures are those of baskets from the willows

of the Paraná Islands; the homespun cotton and woolen cloths, blankets, rugs, laces, and embroideries of the northwestern highland provinces; the tanned leather, wooden ware, laces, blankets, etc., of Córdoba; and the harness, belts, ponchos, horse blankets, ropes, etc., of the Indians. The growth and diversification of Argentine industries are best brought out by the following table, showing the absolute and relative values of the products of the various branches of industry exported from the country at three different periods:

Value in gold pesos (96.5 cents)

| Products | 1895 Pesos | per ct. | 1905 Pesos | per ct. | 1911 Pesos | per ct. |
|---|---|---|---|---|---|---|
| 1 The animal industry | 74,630,000 | 62.1 | 141,043,000 | 43 7 | 162,697,537 | 48 9 |
| 2 Agriculture | 41,450,000 | 34 5 | 170,235,000 | 52.6 | 154,285,547 | 46.5 |
| 3 All other industries | 3,990,000 | 3 4 | 11,566,000 | 3.7 | 15,051,483 | 4.6 |
| Total | 120,070,000 | 100.0 | 322,844,000 | 100.0 | 332,034,567 | 100.0 |

The small export of manufactured products does not indicate lack of industrial progress, since the manufactures go mainly to satisfy the home market. It should also be borne in mind that quite a considerable part of animal and agricultural products are exported in a finished state, e.g., flour and packed meats. The industrial establishments in 1910, aside from those of sugar and wine, numbered 28,661; of these 10,349 were in the city of Buenos Aires, 8647 in the province of Buenos Aires, 2951 in Santa Fé, 1319 in Entre Ríos, and 902 in Córdoba.

**Commerce.** Being an agricultural country, with the manufacturing industry still in its infancy, Argentina must, on the one hand, import most of the manufactured products needed by its people, and, on the other hand, seek to dispose of its enormous agricultural surplus to the nations of Europe. Of the total imports brought into the country, manufactured articles of all kinds constitute more than 86 per cent, while vegetable and animal substances constitute less than 13 per cent; and even these include many manufactured products, such as refined sugar, cigars and cigarettes, dried fruit, and manufactures of rubber. Making allowance for such articles, the value of really crude products of the farm barely exceeds 1 per cent of the total imports; on the other hand, the only manufactured articles exported from Argentina consist of products of the farm and mine, such as refrigerated meat, washed wool, hides and furs, lard, animal oil, linseed oil, flour, copper bars, etc. The imports into Argentina, in the order of importance, are textiles and apparel, iron and iron manufactures, food substances, building material, railway material, and all vehicles, coal and coke, oils, drink, chemicals, lumber and timber, paper and paper manufactures, etc. The trade with Europe has been facilitated by the establishment of branches of foreign mercantile houses in Argentina.

Since British capital has contributed more to the development of the material resources and the industries of Argentina than the investments of any other nation, Great Britain naturally gets the lion's share of Argentina's trade. The principal countries sharing in the import trade of Argentina are: Great Britain, Italy, Germany, the United States, France, Belgium, and Brazil. Of those taking Argentine products, the most important are : Great Britain, Germany, France, Belgium, the United States, and Brazil. The growth of Argentine trade is shown by the following figures (values in millions of gold pesos of 96.5 cents):

| | Imports | Exports | | Imports | Exports |
|---|---|---|---|---|---|
| 1870 | 38 50 | 29 6 | 1885 | 92.25 | 83 9 |
| 1880 | 43.10 | 54.9 | 1890 | 142 25 | 100.8 |

Early in 1890 a severe commercial and financial crisis struck the country, from the effects of which it took her several years to recover. The following figures in pesos gold show the downward movement of the trade within the few years following 1890, marked especially by a sudden shrinkage of imports, and the gradual recovery:

| | Imports | Exports | | Imports | Exports |
|---|---|---|---|---|---|
| 1891 | 67,207,000 | 96,703,000 | 1904 | 187,305,969 | 264,157,525 |
| 1892 | 97,899,000 | 114,667,000 | 1905 | 205,154,420 | 322,843,841 |
| 1893 | 100,913,000 | 94,906,000 | 1909 | 302,756,095 | 397,350,528 |
| 1894 | 92,789,000 | 101,250,000 | 1910 | 351,770,656 | 372,626,055 |
| 1896 | 112,164,000 | 116,802,000 | 1911 | 375,127,176 | 332,034,567 |
| 1900 | 113,485,000 | 154,600,000 | 1912 | 384,853,469 | 480,391,256 |

In the decade from 1903 to 1912 Argentina's total foreign trade increased 145 per cent. For 1912 the exports were classified as follows: Agricultural products, 278,186,572 pesos gold (of which 264,495,250 raw material); live-stock products, 188,215,956; forest products, 8,938,112; products of the chase, 2,008,212; mineral products, 285,272; other, 2,712,132; total, 480,391,256. The 1912 exports included corn valued at 108,908,193 pesos gold; wheat, 97,835,174; wool, 58,148,664; frozen beef, 34,285,076; and linseed, 34,213,565.

The growth of the trade with the United States during the last half-century is shown by the following figures taken from reports of the U. S. Bureau of Commerce and Navigation:

| | Exports to Argentina | Imports from Argentina |
|---|---|---|
| 1850 | $1,064,000 | $2,653,000 |
| 1860 | 999,000 | 4,020,000 |
| 1870 | 2,281,000 | 6,414,000 |
| 1880 | 1,779,000 | 6,214,000 |
| 1890 | 8,320,000 | 5,400,000 |

The crisis of 1890 had a similar effect on the trade with the United States as it had on the general trade of Argentina, the decline continuing for several years. Since 1896, however, the trade has again been increasing as follows:

| | Exports to Argentina | Imports from Argentina |
|---|---|---|
| 1896 | $6,000,000 | $9,300,000 |
| 1900 | 11,600,000 | 8,100,000 |
| 1904 | 16,900,000 | 9,800,000 |
| 1905 | 28,920,000 | 15,717,000 |
| 1912 | 53,158,179 | 29,847,016 |

The trade with the United States increased, not only absolutely, but also relatively. In 1896 the imports from the United States constituted 9.9 per cent of the total import; in 1900, 11.9 per cent; in 1904, 12.8 per cent; and in 1905, 14.1

per cent. The exports from Argentina to the United States were 8.0 per cent in 1896, 5.2 per cent in 1900, and 4.8 per cent in 1905. The chief articles of import from the United States are machinery and all kinds of tools and implements. The American export of agricultural implements to Argentina in 1912 amounted to nearly $7,500,000. The chief articles of export to the United States are wool and hides and skins. Argentine returns show that imports from and exports to the United Kingdom in 1912 were valued at 118,069,226 and 121,373,358 pesos gold, respectively; Germany, 63,941,503 and 53,995,175; United States, 59,126,951 and 32,391,148; France, 37,618,578 and 36,052,069. These figures are exclusive of exports "for orders," which at the point of shipment are not assigned to any country; such exports in 1912 aggregated 114,903.510 pesos.

**Transportation and Communication.** *Shipping.*—The foreign trade of Argentina is carried on chiefly in foreign vessels, mostly British and German. In 1912, 4333 vessels (exclusive of the coasting trade) with a total tonnage of 10,541,697 entered at the ports of the republic, and 4290 of 10,598,838 tons cleared. Of entrances and clearances combined 4450 vessels of 11,770,699 tons were credited to the port of Buenos Aires. The merchant shipping bearing the Argentine flag consisted in 1911 of 161 steamers with a net tonnage of 80,447, and 185 sail of 57,350 tons net; vessels with a tonnage less than 50 are not included in this enumeration.

In September, 1905, the Chamber of Deputies passed a bill looking to the establishment of a direct line of fast steamers between Argentina and European ports.

*Railways.*—Perhaps in no other field has the economic progress of Argentina been so well exemplified as in its railway development. Argentina has a larger railway mileage than any country in America south of the United States, although it has only half the area and about one-fourth the population of Brazil and less than half the population of Mexico.

In 1912 there were 32,853 km. (20,414 miles) of railway. From Buenos Aires the extension in the north is as far as the Bolivian and Paraguayan frontiers; in the west, via Mendoza, to the Chilean frontier, whence the line continues to Santiago and Valparaiso; in the south, via Bahía Blanca to Neuquén. The first railway in Argentina was inaugurated Aug. 30, 1857, and extended 10 km., or a little more than 6 miles, west from Buenos Aires. In 1865 there were 249 km. (155 miles); in 1870, 732 km. (455 miles), including the Central Argentine Railway, extending from Rosario on the Paraná River to Córdoba. The trunk line leading north from Córdoba to Tucumán was built between 1870 and 1880, when the total extension reached 2516 km. (1563 miles). In the following decade the railways increased in length nearly fourfold, reaching 9432 km. (5861 miles) in 1890. By that year the country was covered with a network of railways branching out from the three great industrial centres on the Paraná River—Buenos Aires, Santa Fé, and Rosario. On the south the railway reached the sea at Bahía Blanca; on the west it extended to Mendoza at the foot of the Andes and not far from the Chilean boundary; on the north to Salta, also close to Chile. In 1900 the railways aggregated 16,563 km. (10,292 miles), and in 1910, 27,989 km. (17,392 miles). In April, 1910, was opened the tunnel through the Andes, effecting rail communication between Buenos Aires and the Pacific.

On the economic side Argentina did not escape the experience which has been the lot of all countries where railway building has been allowed to go unchecked under private management. Excessive issue of capital stock, over-speculation, and kindred abuses accompanying the great railway "boom" of the eighties had their day of reckoning, and contributed in no small share to the great commercial panic of 1890, when the government found it impossible to pay interest on railway securities guaranteed by it. It was that experience that led to the gradual withdrawal of guarantees to railways, and the radical reform in railway management which culminated in the creation of a special Ministry of Railways, a sharp supervision of railway management, and a strong tendency toward government ownership and management. The 32,853 km. in operation in 1912 represented a capital of 1,120,210,000 pesos gold; passengers, 73,212,084; freight, 38,869,804; receipts, 129,700,178, and expenditures, 813,488,088 pesos gold. At the beginning of 1912 the railway extension was 31,574 km. (19,619 miles), of which 9831 were narrow gauge (1 meter), 2490 mean gauge (1.435 meters), and 19,253 broad gauge (1.676 meters). State lines, owned partly by the federal government and partly by the provinces, especially Buenos Aires, Santa Fé, and Entre Ríos, aggregated 5360 km. (3331 miles), and private lines 26,214 km. (16,289 miles). The cost of the state lines is reported to have been about 28,650 pesos per kilometer and that of the private lines 35,320 pesos per kilometer.

*Telegraphs.*—In 1910 the telegraph lines aggregated 59,950 km. (37,251 miles), of which 25,602 km. (15,908 miles) were government lines, 27,713 km. (17,220 miles) private lines, 5558 km. (3454 miles) Buenos Aires provincial lines, and 1077 km. (669 miles) Entre Ríos provincial lines. The length of wire was about 161,000 km. (100,040 miles), of which about 62,000 km. (38,525 miles) belonged to the federal government. There is telegraph communication with Valparaiso, whence a submarine cable connects with San Francisco, Cal. Buenos Aires is connected with Montevideo by submarine cable, and also with Europe by way of Rio de Janeiro and the Cape Verde Islands; and in this indirect way with the United States also. There is, besides, a cable between Buenos Aires and Lisbon.

**Banking.** The first bank established in Argentina was the Banco de la Provincia Buenos Aires, opened in 1822. It was followed by a number of other banks, but none of them managed to exist long, as the insignificant commerce of the country was not sufficient to maintain such institutions. The real banking history of the country dates from 1872, when the Banco Nacional, with a capital of 50,000,000 pesos, was founded. In 1882 the first foreign bank, the Banco Italiano del Río de la Plata, was established, and the growing commerce of the country soon led to the establishment of French, German, and Spanish banks, which the respective nations established in the interests of their own commerce. By a law of Nov. 3, 1887, national banks, resembling those of the United States, were established. The creation of these banks without proper safeguards thrown around them, followed by great abuse of the inadequate law by government officials, soon resulted in flooding the

country with worthless paper money. Speculation on a scale that left far behind the worst features of the German *Gründer* fever in the early seventies, and resembling much the excesses of the days of John Law (q.v.) in France, gave the country for a time the appearance of genuine prosperity; the "boom" was skillfully utilized through the medium of the Paris Exposition of 1889 to attract still more foreign capital, and the scramble for wealth went on until it culminated in financial panic. The panic swept away the numerous national banks, most of which had nothing but paper and a political "pull" with the directors of the National Bank at Buenos Aires as their chief assets. The National Bank itself, robbed of its capital by its directors and by politicians, was declared insolvent, and was reorganized in 1891, under the name of the Banco de la Nación Argentina, with a capital of 50,000,000 pesos paper; its capital in October, 1912, amounted to 120,999,950 pesos paper. In addition, there are 14 provincial banks and many commercial and agricultural banks. In 1899 the paper peso was fixed by the Congress of Argentina at .44 of the gold peso, thus contributing to the stability of the currency. At the end of 1912 the gold held by the Banco de la Nación Argentina and the Conversion Office amounted to 239,259,062 pesos.

**Government.** The constitution of Argentina, adopted in 1853 and modified in 1860 and in 1898, is modeled closely upon that of the United States; and the entire system of government, both federal and provincial, is almost identical in its chief features with our own. The legislative power is vested in a Congress consisting of a Senate and a House of Representatives. The Senate is composed of 30 members, elected 2 each by the legislatures of the 14 provinces, and 2 by the Federal District. They serve for nine years, but the terms of one-third of them expire every three years. The lower house consisted in 1912 of 120 members, elected directly by the people for a term of four years, one-half of the House being renewed every two years. To the House of Representatives is reserved the right of initiating bills dealing with taxation and military conscription and of impeaching the national executive and judiciary. The executive power is vested in a president, elected for a period of six years by the same method as that pursued in the United States, except that the number of electors chosen by each province is twice the number of its representatives in Congress. The president acts through his ministers, eight in number, who preside over the departments of the Interior, Foreign Affairs and Worship, Finance (Hacienda), Justice and Public Instruction, War, Navy, Agriculture, and Public Works. The ministers may appear and speak in Congress, though they have no vote, and are responsible for the acts of the chief executive, whose decrees they must countersign separately or jointly. Through the ministers the president may initiate legislation in either house. The Supreme Court of the republic consists of five judges and an attorney-general, appointed by the president, with the approval of the Senate. It exercises similar jurisdiction to that of the United States Supreme Court.

The provinces, 14 in number, have each their own constitution and exercise complete control over their own affairs. They possess even greater power than the States of our Union, in that they may conclude treaties (with the consent of Congress) for the fostering of industry, immigration, colonization, railways, and canals. The governor is elected directly by the people for a period of three or four years. The national domain is divided into 10 territories, controlled by Congress and ruled by governors appointed by the president. When a territory acquires a population of 30,000, it is granted the power of choosing a legislature, and when its inhabitants number 60,000, it must of right be admitted as a province with boundaries determined by Congress. For purposes of administration and police, the republic is divided into 425 departments and 1750 districts. The national capital is Buenos Aires.

*Local Government.*—Every community of more than 1000 inhabitants may be erected into a municipal corporation. In the provinces of Buenos Aires, Santa Fé, Entre Ríos, San Juan, and Corrientes, the municipalities are supreme in the sphere of local government. The municipal presidents and councils are elected by the people, except the *intendente* ('governor') of Buenos Aires, which comprises the Federal District, who is appointed by the president of the republic. In the other provinces the municipalities are subject to inspection and regulation by the government officials and judicial authorities. Foreigners are eligible to any municipal office.

**Immigration and Emigration.** From 1857, when immigration statistics were first recorded, to 1911, the immigrants by sea numbered 3,924,952; in the same period emigrants numbered 1,156,871. Of the immigrants, 2,053,242 were Italian, 1,132,230 Spanish, 201,732 French, 115,827 Russian, 89,442 Syrian, 68,525 Austro-Hungarian, 50,731 German, 48,526 British, 30,619 Swiss, 21,781 Belgian, and 16,419 Portuguese. Immigration from 1857 to 1860 was 20,000; thereafter by decades it has been as follows: 1861–70, 159,570; 1871–80, 260,613; 1881–90, 846,568; 1891–1900, 648,326; 1901–10, 1,764,103. The financial panic of 1890 caused a great decrease, the immigration in 1889 being 261,000 and in 1901 only 52,000. Immigration and emigration have been as follows: 1906, 302,249 and 103,853; 1907, 257,924 and 138,063; 1908, 303,112 and 127,032; 1909, 278,148 and 137,508; 1910, 289,640 and 97,854. Immigrants in 1910 included 131,466 Spaniards, 102,019 Italians, 15,478 Syrians, and 12,765 Russians.

The Argentinians have long understood the value of immigration to a naturally rich and fertile, but sparsely settled country like their own, and have accordingly made great efforts to attract foreign labor, as well as foreign capital, to their country. In addition to liberal immigration laws, and generous distribution of land to colonists, large sums of public and private money have been spent in bringing over and aiding immigrants. While encouraging white immigration to the agricultural and grazing lands, the government does not favor any further increase of unskilled laborers in Buenos Aires and other cities.

**Education.** The public-school system of Argentina was admirably organized by President Sarmiento (1868–74), but on the whole it has not been kept up to the standard he set for it. Primary education is free and obligatory for all children between the ages of 6 and 14. The elementary schools are supported by the individual provinces, although subsidized by the federal government. They are under the general control of provincial boards of education, while the

details of administration are left to district school boards. The schools in the territories and the Federal District are managed by a National Board of Education under the supervision of the Minister of Justice and Public Instruction. Besides the regular elementary schools, there are kindergartens, schools for adults, and, in sparsely settled districts, ambulatory schools. In some of the provinces, and in the federal schools, religious instruction of any kind may be imparted outside of school hours; in others only the Catholic faith may be taught; in one, Entre Ríos, no religious instruction is permitted. The population of school age in 1911 was reported at 1,025,570, of whom about 45 per cent attended school, and of the latter only about 13 per cent could read and write. Slightly more than half of the total population was reported illiterate. Primary schools, public and private, numbered, in 1911, 7183, with 746,725 pupils and 22,456 teachers. Secondary education is controlled by the federal government, which maintains 27 national colleges (10,227 students and 1533 teachers) and 62 normal schools. Higher education is provided by the national universities at Buenos Aires, Córdoba, and La Plata, and by the provincial universities at Paraná and Santa Fé; the university teachers number about 450 and the students over 7300, of whom more than half are credited to the University of Buenos Aires. The federal expenditure on education in 1911 was over 19,200,000 pesos paper.

**Religion.** The constitution guarantees freedom of religion to all, but makes the Roman Catholic faith that of the State. The country is divided into five dioceses and one archiepiscopate. The government builds churches and supports the Catholic priesthood, but it controls all ecclesiastical appointments, and sanctions or rejects the decrees of the papal see. Marriage was made the subject of a civil contract in 1884. The native Argentinians are nearly all Roman Catholics. Of the 3,954,911 people returned by the census of 1895, 3,921,136 were Catholics, 26,750 Protestants, 6085 Jews, and 940 belonged to other denominations.

**Finance.** The economic progress of Argentina has been accompanied throughout its course by extremely unfavorable financial conditions. The chief cause of the unsatisfactory state of public finance has been the large increase of expenditure incurred without reference to the financial strength of the people. Students of Argentine affairs unite in the opinion that the politicians of the country embarked with too light hearts on all kinds of undertakings—some productive, others wasteful and useless; moreover, the administration of the budget was until recently extremely loose. In 1870 the total budget of the government was 12,635,000 pesos; in 1880 it was 16,815,000 pesos, or an increase of 33 per cent in one decade; in 1890 it was 71,508,000 pesos, or a further increase of 325 per cent; and in 1900 it was 95,000,000 pesos paper and 33,000,000 pesos gold, or, reducing it all to a paper basis, 194,000,000 pesos, or a further increase of 171 per cent. Dr. Alberto B. Martínez, formerly Assistant Minister of Finance, ascribes the great increase in public expenditure to the following principal causes: (*a*) Increase of administrative functions, due to rapid growth of population; (*b*) increase of public debt; (*c*) depreciation of paper money; (*d*) wars, foreign and civil; (*e*) guarantee by the State of the payment of interest on costly public works; (*f*) imperfect administrative machinery; (*g*) defective control of public expenses, etc. In 1890, on the eve of the great financial crisis, the revenues of the republic amounted to 73,408,000 pesos paper, as against an expenditure of 92,854,000 pesos. The enormous deficit, together with the general unsettled financial condition of the country, forced the government to suspend payment on the national debt, and during the following years the revenue continued to decline. Although since 1895 the revenue has been steadily increasing, the expenditure has often been in excess, as is shown by the following figures (in pesos):

| Year | Revenue | | Expenditure | |
|---|---|---|---|---|
| | Gold | Paper | Gold | Paper |
| 1895 | 29,800,000* | 29,000,000* | 24,200,000* | 83,900,800* |
| 1900 | 46,000,000* | 67,100,000* | 32,900,000* | 95,400,000* |
| 1901 | 38,185,343 | 62,318,816 | 29,216,218 | 94,658,119 |
| 1902 | 40,238,779 | 59,531,150 | 41,629,990 | 104,035,062 |
| 1903 | 46,615,856 | 65,466,010 | 37,149,031 | 98,441,878 |
| 1904 | 52,254,429 | 69,961,835 | 32,087,241 | 122,031,533 |
| 1905 | 53,076,067 | 84,778,282 | 82,345,819 | 134,906,626 |
| 1906 | 61,616,089 | 88,835,790 | 51,413,656 | 153,403,724 |
| 1907 | 64,527,983 | 97,153,871 | 29,521,411 | 186,107,108 |
| 1908 | 68,197,676 | 99,237,264 | 25,756,809 | 193,845,362 |
| 1909 | 74,165,574 | 106,607,826 | 68,768,368 | 235,969,955 |
| 1910 | 84,809,876 | 112,407,150 | 41,598,523 | 260,273,231 |

* Estimated.

The budget of 1912 showed revenues of 89,281,681 pesos gold, and 128,751,718 pesos paper, and expenditures of 29,909,343 gold, and 248,764,942, paper.

Of the total revenue, import duties furnish about three-sevenths, the remainder being derived from excise taxes on spirits, wines, and tobacco (one-fifth), land and stamp taxes (about 7 per cent of total revenue), proceeds from railways, telegraphs, and posts (about 6 per cent of revenue), and a number of other taxes. The increase of internal taxation took place in the early nineties to put a stop to the growing deficits and to put the country in a position to resume payments on the debt. The growth of the Argentine debt during the last three decades of the century was in round figures as follows: 1870, $47,000,000; 1880, $85,000,000; 1890, $353,000,000; 1900, $440,000,000. At the end of 1911 the external debt amounted to 303,719,786 pesos gold, and the internal debt to 161,367,000 pesos gold and 139,656,940 pesos paper; the floating debt was 34,064,123 pesos paper, and there was outstanding paper money amounting to 685,150,000 pesos. The annual interest of the debt requires about 28,000,000 pesos gold.

**National Defense.** Military service is compulsory upon male citizens between 20 and 45 years of age—nominally for a period of 25 years, of which from 3 months to one year are spent in continuous service. The country is divided into five military districts, each providing a complete division of the first line. The active strength of the army is 21,680 officers and men, and a total peace footing of about 170,000. The infantry is equipped with the Mauser magazine rifle, and the cavalry with a carbine of the same type, while the artillery use the Krupp 7.5 cc. gun. See NAVIES.

**Weights, Measures, and Money.** The metric system was officially adopted in 1887. Gold is

the standard of value. A gold peso ($) equals 96.5 cents in United States money. A peso has 100 centavos. The paper peso is equal to 44 centavos gold money.

**Population.** The table below shows by provinces the area of Argentina and the population according to the census of 1895 and the official estimate of Dec. 31, 1910. The figure given for total area should be regarded only as an approximation. Different areas are stated even in the Argentine reports, one being 2,987,353 square kilometers (1,153,417 square miles) and another 2,952,551 square kilometers (1,139,980 square miles); while a recent planimetric calculation gives 2,806,400 square kilometers (1,083,551 square miles).

| Provinces | Population 1895 | Est. pop. Dec. 31, 1910 | Area in square miles |
|---|---|---|---|
| 1. Eastern Littoral | | | |
| Federal District | 663,854 | 1,314,163 | 72 |
| Buenos Aires | 921,168 | 1,921,183 | 117,809 |
| Santa Fé | 397,188 | 879,935 | 50,929 |
| Entre Ríos | 292,019 | 382,794 | 28,792 |
| Corrientes | 239,618 | 336,218 | 32,586 |
| Total 1. | 2,513,847 | 4,834,293 | 230,188 |
| 2. Central | | | |
| Córdoba | 351,223 | 610,475 | 62,176 |
| San Luis | 81,450 | 120,634 | 28,542 |
| Santiago del Estero | 161,502 | 221,683 | 39,774 |
| Total 2 | 594,175 | 952,792 | 130,492 |
| 3. Western Andes | | | |
| Mendoza | 116,136 | 238,316 | 56,517 |
| San Juan | 84,251 | 121,143 | 33,724 |
| Rioja | 69,502 | 91,365 | 34,555 |
| Catamarca | 90,161 | 113,264 | 47,544 |
| Total 3 | 360,050 | 564,088 | 172,340 |
| 4. Northern | | | |
| Tucumán | 215,742 | 314,234 | 8,928 |
| Salta | 118,015 | 153,192 | 62,200 |
| Jujuy | 49,713 | 63,311 | 18,981 |
| Total 4 | 383,470 | 530,737 | 90,109 |
| 5. Territories | | | |
| Northern | | | |
| Misiones | 33,163 | 44,950 | 11,282 |
| Formosa | 4,829 | 16,200 | 41,402 |
| Chaco | 10,422 | 33,500 | 52,741 |
| Los Andes | . . | 3,100 | 24,985 |
| Total | 48,414 | 97,750 | 130,410 |
| Central | | | |
| Pampa | 25,914 | 90,250 | 56,320 |
| Western | | | |
| Neuquén | 14,517 | 29,000 | 42,345 |
| Southern | | | |
| Río Negro | 9,241 | 34,000 | 75,924 |
| Chubut | 3,748 | 30,000 | 93,427 |
| Santa Cruz | 1,058 | 6,500 | 109,142 |
| Tierra del Fuego | 477 | 2,500 | 8,299 |
| | 14,524 | 73,000 | 286,792 |
| Total 5 | 103,369 | 290,000 | 515,867 |
| Total population | 3,954,911 | . | . |
| Population not returned by census | 60,000 | . | . |
| Indians | 30,000 | . | . |
| Grand Total | 4,044,911 | 7,171,910 | 1,138,996 |

The calculated or enumerated population of Argentina in 1869 is stated at 1,821,211; in 1872, 2,231,049; in 1888, 3,158,434; in 1895, 3,951,911; at the end of 1910, 7,171,910. The increase from 1869 to 1895 was about 120 per cent. The urban population constituted 34.6 per cent of the total population of the country in 1869, and 42.8 per cent in 1895, thus keeping pace with the industrial development of the country. In the United States the urban population constituted 36.1 per cent of the total in 1890, 40.5 per cent in 1900, and 46.3 in 1910. Of the 3,954,911 persons reported by the 1895 census, 2,088,919 were males and 1,865,992 females, the great excess of males being a common phenomenon in young countries attracting large numbers of immigrants. There were 2,950,384 natives, as against 1,004,527 foreigners, or, in other words, more than one-third of the population consisted of immigrants, among whom the proportion of males to females was about 7 to 4. The best represented nationalities among the foreign population were: Italians, 492,636; Spaniards, 198,685; Frenchmen, 94,098; and South Americans (Brazilians, Chileans, etc.), 117,000. The Indians seem to be fast dying out, their number having decreased from more than 93,000 in 1869 to 30,000 in 1895. The density of population increased from 1.6 per square mile in 1869 to 3.7 per square mile in 1895, ranging in the latter year from 0.16 per square mile in the territory of Neuquén to 11.1 in the province of Buenos Aires.

**History.** The Río de la Plata was entered in 1515 by Juan Díaz de Solis, who was searching for a southwest passage to the East Indies, and in 1527–28 Sebastian Cabot ascended the Paraná to its confluence with the Paraguay, giving the name La Plata (silver) to the latter stream, from the stories of hoards of silver which he heard from the Indians, who told him that the metal came from the head waters of the river in the west, i.e., Bolivia. At the junction of the Carcarañal and the Paraná, above the present site of Rosario, he built a fort. In 1535 Don Pedro de Mendoza visited the new country and founded Buenos Aires, which was abandoned by the colonists in 1536 and was not permanently established until 1580. Meanwhile Asunción (1536), Santa Fé (1573), and other places had been settled, and horses and cattle had been introduced. Spanish colonists from Peru had founded cities in the northwest, Tucumán (1565) and Córdoba (1573), and down to 1776 the basin of the Río de la Plata was a dependency of the viceroyalty of Peru. In that year the viceroyalty of Buenos Aires was formed, including Bolivia, Paraguay, and Uruguay, and the country was governed by viceroys until 1806, when, during the war of France and Spain against England, Buenos Aires and Montevideo were occupied by the English. Buenos Aires, however, was recaptured by the inhabitants, who, forced to defend themselves, saw the need and advisability of independence of the mother country. Accordingly, they refused in 1808 to acknowledge Joseph Bonaparte as King of Spain, and on May 25, 1810, the people deposed the Spanish viceroy, and the struggle for independence began. A provisional government was instituted under a *junta gubernativa*, which was replaced early in 1814 by a "Supreme Board of the United Provinces," under the virtual control of one man, Antonio de Posados. Civil strife followed, and on July 9, 1816, a general congress at Tucumán declared the independence of the "United Provinces of the Río de la Plata," though this was not substantially attained without war (1817–24) and was not recognized by Spain until 1842. During 1826–28 there was war with Brazil for the possession of the Banda Oriental (Uruguay), which in 1828 was finally recognized by both as an independent state, and from 1827 to 1831 the Plata provinces were practically isolated from each other. In 1831 Buenos Aires, Entre Ríos, Corrientes, and Santa Fé formed a federal compact, and invited the

others to join them; but anarchy resulted till 1835, when Gen. Manuel de Rozas was installed as dictator. His tyrannical efforts to make Buenos Aires supreme led to his downfall in 1852. In 1853 a constitution, still in force, was adopted for the "Argentine Republic," but Buenos Aires refused to accept the document, and in 1854 declared itself independent, but was defeated in 1859 and obliged to reenter the Confederation. Hostilities were soon renewed (1861), however, and though the province did not again become independent, it increased greatly in relative importance, and the city of Buenos Aires supplanted Paraná as the capital of the Confederation. During 1865–70, under the presidency of Gen. Bartolomé Mitre and of Gen. Domingo Faustino Sarmiento, a war was waged against Paraguay by the Argentine Republic, Brazil, and Uruguay, with little benefit to the republic. In 1881 a treaty was made with Chile by which Argentina acquired all the country east of the Andes, comprising Patagonia and the eastern part of Tierra del Fuego. In July, 1890, a revolution broke out, aided by the army and navy—the result of the political and financial corruption of the cabinet officers and the stagnation in business produced by debasement of the currency. President Miguel Juárez Celmán was forced to resign, and was succeeded by Dr. Carlos Pellegrini, who held office until October, 1892, when Dr. Luis Sáenz-Peña was inaugurated. Sáenz-Peña made a vigorous effort to put the country on a proper financial basis, conditions having continued very bad since the failure of the Barings, which was largely brought about by their extensive dealings in unproductive Argentine securities. Repeated political disturbances at the various provincial capitals, however, prevented any successful financial reorganization or sufficient commercial improvement, and in January, 1895, Sáenz-Peña resigned, and the vice-president, Dr. José Evaristo Uriburú, took the executive chair. He held office until 1898, when Lieut.-Gen. Julio A. Roca, who had occupied the place between 1880 and 1886, was again elected president. The dispute with Chile over the boundary in the Atacama region was submitted for arbitration to the United States minister at Buenos Aires, whose decision, rendered in March, 1899, gave to Argentina about 25,000 square miles of territory. The question of the Patagonian boundary was settled in November, 1902, after years of controversy, by the decision of a commission appointed by the King of Great Britain, to whom the two countries submitted their claims. Of the disputed area Argentina received about 15,600 square miles and Chile a little over 21,000 square miles. The delimitation of the boundary was concluded in March, 1903. In May, 1902, the two governments entered into an agreement providing for a cessation in the increase of naval armaments and the ultimate establishment of an equilibrium between the two fleets. Dr. Manual Quintana, who assumed the presidency Oct. 12, 1904, was active in advocating measures looking to the improvement of the finances and the industrial life of the nation. In July, 1905, Congress passed a law providing for the conversion of the internal debt and a measure providing for the conversion of the foreign debt was adopted by the Chamber in August. A military insurrection in the provinces of Buenos Aires, Santa Fé, and Córdoba, early in February, was suppressed in the course of a few days. An abortive uprising occurred in Santiago del Estero in June. In August an anarchist attempt was made on the life of the president. Strikes among the harbor and railroad employees led to the proclamation of a state of siege in October. President Quintana died in March, 1906, and was succeeded by the vice-president, Dr. Figueroa Alcorta. The latter finished his term and in 1910 was succeeded by Dr. Roque Sáenz-Peña. See NAVIES.

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**ARGENTINE**, är'jen-tēn. Formerly a city in Wyandotte Co., Kans., but annexed to Kansas City in 1910; on the Atchison, Topeka, and Santa Fe Railroad (Map: Kansas, H 2). It has a structural steel company, zinc and chemical works, an ice plant, grain elevators, and extensive railroad repair shops. Pop., when annexed, about 6300. See KANSAS CITY.

**ARGENTINE** (Fr. *argentin*, silvery, from Lat. *argentum*, silver). A small deep-sea smelt, most abundant on the southern coasts of Europe, where it is seined in schools, with anchovies and sardines. These fishes are chiefly remarkable and valuable for the resplendent silvery lustre of their sides and the abundance of nacre, the substance used in making artificial pearls, with which their air bladder is externally loaded. It consists of a coat of silvery fibres. Representatives of the genus (*Argentina*) are found on both shores of America. See Plate of WHITEFISH, SMELT, ETC.

**ARGENTINE REPUBLIC.** See ARGENTINA.

**AR'GENTITE**, or SILVER GLANCE. A gray sulphide of silver occurring massive or in isometric crystals. It is a rich ore of silver.

**ARGENTON**, är'zhän'tôn'. A town in the department of Indre, France, 72 miles from Poitiers (Map: France, N., G 6). It is on the Creuse River, and many old houses and remains of castles give it a quaint appearance. The principal industry is the manufacture of boots and shoes, and there are several tanneries. Argen-

ton lies just south of the Roman Argentomagus. Pop., 1911, 6122.

**AR'GENTORA'TUM.** The Latin name for Strassburg, derived from an old Celtic term signifying 'the Stone of Argantos.'

**ARGHOOL,** är-gōōl'. A wood wind instrument of the Arabs, invented in post-Mohammedan times. It consists of two tubes, made of common cane, with a reed mouthpiece. One tube is always, the other usually, perforated.

**ARGILE PLASTIQUE,** är'zhēl' plȧ'stēk' (Fr. plastic clay). A series of beds at the base of the Tertiary system in France, which consist of extensive deposits of sand, with occasional beds of plastic clays, used for pottery. See TERTIARY SYSTEM.

**AR'GILLA'CEOUS ROCKS** (Lat. *argillaceus*, clayey, from *argilla*, Gk. ἄργιλλος, *argillos*, white clay, potter's earth; cf. ἀργός, *argos*, shining, white). Rocks consisting of or containing more or less clay. Pure clay, or kaolinite, a hydrated silicate of aluminum, is always an alteration product of other minerals, particularly of feldspars. However, the term "clay" is applied to practically all plastic or sticky masses of earth or shale, which may include, besides kaolinite, a variety of minerals, such as quartz, feldspar, limonite, hematite, magnetite, etc. Clay deposits may be either residual or transported—i.e., formed in place, or carried to the point of deposition by water, wind, or glaciers. They are derived from the alteration of igneous rocks, limestone, sandstone, or shale. When consolidated without deformation, so that they have partings or capacity to part along planes of deposition, clay deposits form shale. When consolidated and so metamorphosed that new planes of cleavage are developed at angles to the deposition planes, the clay is known as a slate or clay slate. When still more metamorphosed, the clay may be known as a phyllite. Argillaceous rocks may be readily identified by the peculiar odor which they emit when breathed upon. These rocks grade by admixture of lime into calcareous rocks or limestones. See ARENACEOUS ROCKS; ROCK; GEOLOGY; CLAY.

**AR'GILLITE.** See SHALE.

**AR'GINU'SÆ.** Three islets off the south coast of the island of Mytilene (Lesbos), Asiatic Turkey. Near their shores the Spartan fleet under Callieratides was defeated by the Athenian fleet under Conon, September, 406 B.C.

**ARGIVES,** är'jīvz, or ARGIVI (Lat. *Argivi*, Gk. Ἀργεῖοι, *Argeioi*). (See ARGOLIS.) The inhabitants of Argos. In Homer, the name is applied to all the Greeks.

**AR'GO.** See ARGONAUTS.

**ARGO.** A large southern constellation in which is commemorated the mythical ship of the expedition of the Argonauts (q.v.). On account of its great extent, modern uranographers have subdivided Argo into three smaller constellations, *Puppis* (the Poop), *Vela* (the Sails), and *Carina* (the Keel). Canopus, a star of the first magnitude, is its chief ornament. Its declination (52° 38′ S.) renders it invisible in the northern and central United States. The star $\eta$ Argus, or $\eta$ Carinæ, as it is now generally called, has undergone greater changes in brightness than any other variable star of its class. Apparently unknown to Ptolemy, who catalogued other bright stars culminating at the same altitude at Alexandria, it was first observed by Halley at St. Helena in 1677 when it showed as a star of the fourth magnitude. During the greater part of the eighteenth century it was classed as a second magnitude star, but in 1811 it was again of the fourth magnitude. With several minor variations, it reached its maximum splendor in 1843, when it was only slightly inferior to Sirius in brightness. Sinking slowly in brilliancy, it brightened again for a short time in 1856, and then faded, rapidly at first and later more slowly, until 1886, when it assumed its present condition. It has been invisible to the naked eye since 1868, and now shows as a telescopic star of the seventh magnitude. It is situated in a remarkable nebula, named by Sir John Herschel the "keyhole" nebula, on account of its shape. Photographic observations made at the Cape of Good Hope Observatory in 1899 leave little room to doubt the existence of some connection between $\eta$ Carinæ and the nebula.

**AR'GOB.** A district in Bashan, which, according to Deut. iii. 4, contained threescore walled cities, "the kingdom of Og." Its exact location is uncertain. The Targums translate Argob by Trakona—i.e., Trachonitis, the modern El Leja—which, indeed, abounds in deserted towns and villages. Some of these are cave dwellings or subterranean chambers; others are built above ground, of massive blocks of black basalt, with heavy doors moving on pivots, staircases and roofs of the same material. The latter belong to the period from the first to the seventh century A.D., according to De Vogüé, Barton and Drake, Wetzstein and Waddington; though it is possible that the Greek cities may have been built on the sites of earlier towns, as Driver suggests. In Deut. iii. 14, Jair, son of Manasseh, is said to have conquered the region of Argob as far as Geshur and Maacha. But the Hawoth Jair were tent villages in Gilead, not walled cities in Bashan. Argob may have been situated on the western slopes of Jebel Hauran, north of Salchil, but this is far from certain. A most careful description of the region is given by J. G. Wetzstein, *Reisebericht über Hauran und die Trachonen* (Berlin, 1860); cf. also the excellent plates in De Vogüé's *Syrie Centrale* (Paris, 1869). Porter, *Five Years in Damascus* (London, 1870), and *Giant Cities of Bashan* (London, 1869), are interesting but somewhat unreliable.

**AR'GOL** (of uncertain origin, perhaps from Gk. ἀργός, *argos*, white). The crude potassium bi-tartrate which is found as a crust in wine vats. It exists originally in the juice of the grape, but is deposited during fermentation, as it is sparingly soluble in an alcoholic liquid. Accordingly as it is deposited from the red or white grape, it is called *red argol* or *white argol*. In addition to the potassium bi-tartrate it usually contains small quantities of calcium tartrate with coloring and extractive matters. Crude argol is purified by dissolving in water and heating for several days; on cooling, the clear liquor is run off, the deposited crystals constituting the commercial cream of tartar. In the crude state argol is used in metallurgy as a reducing agent in fire assaying; the organic matter combines with the oxygen of the lead oxide, and the potash-lime elements combine with the silica of the ore forming a slag.

**AR'GOLIS** (Gk. Ἀργολίς). A division of ancient Greece. In its wider sense it is the northeast portion of the Peloponnesus, bounded on the west by Achæa, Arcadia, and Laconia; on the north bordering on the Corinthian and Saronic gulfs; and penetrated on the south by

the Argolic Gulf, which separates the portion bordering on Laconia, the Kynuria, from the eastern peninsula. This district, containing about 1700 square miles, is filled with mountains, and never in historical times formed one kingdom; the northern states—Sicyon, Corinth, and Phlius—were often considered outside of Argolis proper. The chief towns of the eastern peninsula were Epidaurus, Troezen, and Hermione. The plain of Argos, in the middle portion, was famed for its fertility, and contained the cities of Mycenæ, Tiryns, and Argos, and was called Argeia. The edge of this plain is now swampy; the southeast portion contained, even in ancient times, the swamp of Lerna, home of the Hydra (q.v.), slain by Hercules. In the legends Argolis plays an important part. Mycenæ was the home of Agamemnon and the capital of Argolis, though other chiefs ruled at Argos, Midea, and Tiryns. Here, also, was placed the birth of Hercules (q.v.), and his contests with the Nemean lion and the Lernean hydra. Still earlier the plain was the scene of the story of Inachus and his daughter, Io; of Danaus and his daughters; and of the rule of Perseus and Pelops.

In historic times the chief city was Argos, which held possession of the Argive plain and was at the head of a somewhat loosely organized league of several of the Argolic states, which under King Pheidon (c.670 B.C.) became a great power in the Peloponnesus. Later the growing power of Sparta greatly lessened the influence of Argos, which, however, always remained a jealous rival, and during the fifth and fourth centuries B.C. usually appears in alliance with Athens.

The principal divinity of Argos was Hera, who had a very ancient sanctuary to the east of the city, the Heræum, where was a celebrated gold and ivory statue of the goddess, the work of Polycletus. This sanctuary was excavated by the American School of Classical Studies at Athens, from 1892 to 1895; the excavators discovered a large number of buildings, including earlier and later temples, much interesting sculpture, and a great mass of pottery, showing that this had been a place of worship from the earliest times. Argos was the seat of a celebrated school of artists in bronze and was also famed for its musicians. The modern town is a flourishing place on the site of the ancient city, of which few traces remain in sight. Argolis is one of the nomes of the kingdom of Greece. The capital is Nauplia. Consult Waldstein, *Excavations at the Heraion of Argos* (1892). See EPIDAURUS; HERÆUM; MYCENÆ; TIRYNS; TROEZEN.

**AR'GON** (Gk. *ἀργόν*, neut. of *ἀργός*, *argos*, inactive, inert, alluding to its incapacity for entering into chemical combination). A gaseous element discovered in 1895 by Lord Rayleigh and Sir William Ramsay, although Cavendish had undoubtedly obtained a minute quantity of it from atmospheric air in 1785. Argon is contained in the atmosphere to the extent of nearly 1 per cent. It was obtained by its discoverers by passing air through a combustion tube packed with metallic copper, which absorbed the oxygen, after which the gas was passed through an iron tube packed with magnesium turnings and heated in a combustion furnace. The magnesium absorbed the nitrogen, and the argon, in its gaseous form, was then collected in a holder. It was also obtained by adding oxygen to air, subjecting the mixture to the action of an electric current in the presence of an alkali, and removing all oxygen by means of pyrogallic acid. The density of the argon made by means of magnesium was 19.94 (the density of oxygen being taken as 16). The elementary nature of argon has been demonstrated by a comparison of its specific heats at constant pressure and at constant volume, which showed that a molecule of argon is made up by a single atom and hence is not compound. But if this is true, then the molecular weight (i.e., twice the density) of argon is identical with its atomic weight, and hence the latter is concluded to be about 40. Sir William Crookes found in the spectrum of argon two characteristic lines near the red end that could not be mistaken for the lines of nitrogen or of any other element. However, the spectrum of argon has been found to change greatly with the means employed in producing it. Argon cannot be liquefied unless its temperature is reduced to at least 121° below zero C. At that point a pressure of 50.6 atmospheres (759 pounds per square inch) is sufficient to produce liquefaction. Under ordinary atmospheric pressure liquid argon boils at —187° C. At the temperature of —189.6° C. it freezes. No well-defined chemical compound of argon with other substances is as yet known. Its discoverers received the first Hodgkins Medal and the grand prize of the Smithsonian Institution at Washington. Consult Lord Rayleigh and Sir W. Ramsay, "Argon, a New Constituent of the Atmosphere," *Smithsonian Contributions to Knowledge* (Washington, 1896).

**AR'GONAUT.** A small pelagic octopod cuttlefish of the genus *Argonauta;* specifically, the paper sailor or paper nautilus (*Argonauta argo*). The female is many times longer than the male and secretes a thin, iridescent, crenelated, and somewhat boat-shaped shell, which serves as a brood pouch. In calm weather the animal rises to the surface and seems to voyage about, whence the fanciful name and sundry fables. For fuller description, see OCTOPUS.

**AR'GONAU'TICA.** The name of various epic poems narrating the deeds of the Argonauts, especially one written by Apollonius of Rhodes and one by Valerius Flaccus, a Roman of the first century A.D. Flaccus's work is a free imitation of that of Apollonius.

**AR'GONAUTS** (Gk. *Ἀργοναῦται, Argonautai*, i.e., the sailors on the ship *Argo*). A name given to those who, under command of Jason, undertook a voyage famous in Greek legend. The *Argo* is mentioned in the *Odyssey*, and incidents of the story appear in the Hesiodic poems. Allusions to the story, often contradictory and influenced by local legends, are scattered through the fragments of lyric poetry, and single episodes of it were used by the tragedians, though only the Medea of Euripides (q.v.) has survived. These fragments, and the somewhat more satisfactory scraps from the prose writers, are the chief sources for the earlier versions; but our most complete and valuable account is contained in the poem, in four books, by the Alexandrian poet and scholar, Apollonius of Rhodes, who tried to combine the mass of material with which his studies had made him familiar into a connected and consistent narrative. A brief narrative is also found in the mythological handbook which goes under the name of *Apollodorus.* (For Roman versions of the story see APOLLONIUS RHODIUS.) In its

main outlines the story is as follows: Pelias, King of Iolcus, in Thessaly, having reason to fear his nephew, Jason, commanded him to fetch from King Æetes, in Colchis, the golden fleece of the ram which had borne away Phrixus and Helle (q.v.). With the help of Hera and Athena, Jason and Argos, son of Phrixus, built a wonderful ship, strong and swift, but light, and, since it bore a piece of the oracular oak from Dodona in its keel, capable of delivering prophecies. About him Jason gathered a band of heroes, whose names and number vary greatly, though the party is usually estimated to have comprised about 50. The earlier versions seem to have placed the land of Æetes in the far east, but the later writers placed it in Colchis, on the Black Sea. On the voyage the most notable adventures were: 1. The landing on Lemnos, where the Argonauts found a state of women only, under Queen Hypsipyle, all the men having been murdered shortly before. Here they remained some time, and two sons were born to Jason and Hypsipyle. 2. Near the Bosporus Pollux conquered Amycus, King of the Bebryces, in a boxing match, and so secured for his companions access to a spring. 3. In these same Thracian regions they found the blind prophet Phineus, tormented by the Harpies (q.v.), whom the sons of Boreas, Calais, and Zetes, put to flight; in return Phineus showed the Argonauts how to pass the ever-clashing rocks of the Symplegades. 4. This adventure they accomplished by hard rowing, after they had been encouraged by the sight of a dove, which flew through the passage with only the loss of her tail feathers. When they arrived at Colchis, Æetes demanded that Jason should yoke fire-breathing bulls with brazen hoofs, plow with them a field, sow the dragon's teeth given him by Cadmus, and then destroy the crop of giants which would spring from such seed. All this Jason accomplished, with the help of Æetes's daughter, Medea, who had fallen in love with the hero. With her help, also, he foiled further plots of the King, and, securing the fleece by stealth, fled with Medea and her young brother, Absyrtus. Pursued by Æetes, Medea saved the Argonauts from capture by killing her brother and strewing the fragments of his body into the sea, thus delaying her father, who piously collected his son's remains for burial. The return of the Argonauts was very diversely narrated. Some brought them by way of the Tanais into the Northern Sea, while others led them eastward to the ocean and back across Africa, carrying their ship through the Libyan desert on their shoulders. After many adventures they at length reached Iolcus and delivered the fleece to Pelias. (For the further legends see articles MEDEA; PELIAS.) There are indications that both Jason and Medea were originally worshiped as gods at Corinth and elsewhere, but later sank to the rank of heroes and became connected with the common folk tale of the lover who must perform impossible tasks to win his mistress, but who overcomes all obstacles by magic help. Whatever the origin of the story, there can be no doubt that it was developed under the influence of the voyages that marked the great period of Greek colonization in the eighth and seventh centuries B.C. The wonders and adventures encountered by the first explorers of the Black Sea and the west were thrown back into the mythical past, and told of gods and heroes—Hercules, Jason, and Odysseus.

**ARGONAUTS OF '49.** A name applied to the fortune seekers who emigrated to California in the years immediately following the discovery of gold there in 1848, the largest number of whom went out in 1849. See FORTY-NINERS.

**ARGONNE,** är'gŭn'. A rocky plateau in northeast France, extending along the border of Lorraine and Champagne and forming parts of the departments of Ardennes and Meuse. The Argonne forest proper, or west Argonne, has a length of over 30 miles and a width of from one to eight miles. The forest of east Argonne includes the forest of Apremont. Argonne has been the scene of several stirring historical events, notably in connection with Dumouriez's "Argonne campaign" of 1792 and with the Franco-Prussian War.

**AR'GOS.** See ARGOLIS.

**ARGOSTOLI,** är'gŏs-tō'lē. An episcopal city, capital of the island of Cephalonia, on the east shore of the Gulf of Argostoli, an inlet of Livada Bay (Map: Greece, B 3). The town is famous for its mills, which are driven by a current of sea water, flowing through an artificial channel about 150 feet long, then disappearing through fissures in the rocks. It has an excellent harbor, and it finds considerable trade in exporting wine, oil, melons, and currants. A long bridge connects the north shore of the bay with the Koutavŏs Lagoon, which lies to the south. There is a naval school here. Pop., about 14,000.

**ARGOT,** är'gō'. The French term for what in English is called "slang," especially the dialect of thieves and vagabonds. Like all such dialects, argot is often sparkling with wit and remarkable for aptness and comprehensiveness of expression. Many specimens of it are to be found in Victor Hugo's *Les Misérables*, in Zola's *Assommoir*, and in the lower grade of Parisian journals. Consult: Barrère, *Argot and Slang* (London, 1887); Knoblanch, *Dictionary of Argot* (French-English) (New York, 1912); Sainéan, *Les Sources de l'argot ancien* (Paris, 1912); La Grasserie, *Etude scientifique sur l'argot et le parler populaire* (Paris, 1907); Villatte, *Parisismen* (Berlin, 1906); Yve-Plessis, *Bibliographie raisonné de l'argot et de la langue verte* (Paris, 1901); Delvau, *Dictionnaire de la langue verte* (Paris, no date). See SLANG.

**ARGOUT,** är'gōō', ANTOINE MAURICE APOLLINAIRE, COUNT D' (1782–1858). A French financier. He was born in Isère, and after acting as auditor to the Council of State (1810), became prefect of Gard (1817) and a peer of France (1819). As mediator between Charles X and the popular leaders, during July, 1830, he obtained concessions from Charles, but not until it was too late. He was appointed Minister of the Marine in 1830, and acted as Minister of Commerce (1831) and Minister of the Interior (1833). He was governor of the Bank of France from 1834 until his death, except for a short while in 1836 when he was Minister of Finance. In 1852 he entered the Senate.

**ARGÜELLES,** är-gwā'lyâs, AGUSTÍN (1776–1844). A Spanish politician of the Liberal school. He was born at Rivadisella, in Asturias. On the breaking out of the War of Independence in 1808, he went to Cadiz, where he agitated for the organization of a regency with a free constitution. In 1812 he was sent as representative of his native province to the Cortes, where he was appointed one of the members of a committee to draft a constitution. His splendid talents as a public speaker soon won him the admiration

of the Liberal party, who used to call him the Spanish Cicero. But on the return of Ferdinand VII Argüelles fell a victim to the reactionary spirit which ensued. On May 10, 1814, he was arrested, and after a trial that was a mockery of justice, condemned by the King to 10 years' imprisonment in the galleys at Ceuta. The revolution of 1820 restored him to freedom. Argüelles became Minister of the Interior, but soon resigned, provoked beyond measure by the narrow bigotry of the court. He continued a constitutional Liberal always. In the Cortes held at Seville, in 1823, he voted for the suspension of the royal power; but after the violation of the constitution he fled to England, where he remained till the amnesty of 1832. On his return to Spain he was repeatedly made President and Vice President of the Chamber of Deputies, and always showed himself a moderate but unwavering reformer. In July, 1841, in the discussion of the law regarding the sale of Church property, he spoke strongly against all concordats with the Pope. During the regency of Espartero he was guardian to the young Queen Isabella. In his old age he still exhibited the fiery eloquence that marked his youth. Consult Evaristo San Miguel, *Vida de D. A. Argüelles* (Madrid, 1851).

**AR'GUMENT.** In law, the address by counsel to the court or jury, in which he argues upon the merits of his client's case in order to affect the decision or verdict to be rendered. Arguments to the jury are based upon the facts established or disputed in evidence at the trial of a cause, and upon matter of common knowledge of which the court or jury may take judicial cognizance. It is not strictly limited to the facts, however, counsel having the right to instruct the jury as to the law applicable to the facts presented by him. Arguments addressed to the court may be based either upon the facts before it or upon the law. The time to be devoted to the argument, its scope, and order are subject to the discretionary control of the court. It is the usual practice to permit the attorney for a plaintiff or appellant both to open and close the argument. If in the argument the attorney goes beyond proper comment upon the evidence, or indulges in abuse of a party or attorney in the case, or comments upon failure of a privileged witness to testify, or otherwise so conducts himself as unwarrantably to inflame or prejudice the minds of the jury, it may be ground for setting aside the verdict. See JURY and the authorities referred to under PRACTICE.

**ARGUMENT** (Lat. *argumentum*). In logic, either the ground or premise on which a conclusion is rested, and, more specifically, the minor premise (see LOGIC), or a whole syllogism. Popularly, it is applied to a series of arguments, or to a controversy. *Argumentum ad hominem* is an appeal to the known prepossessions or admissions of the persons addressed. For instance, an attempt may be made to silence an opponent, who has recently changed his mind, by saying: "Your well-known speech last winter leaves you the single course open of admitting that so-and-so is the case." *Argumentum ad rem* is an argument pertinent to the issue. *Argumentum e consensu gentium*, or *ad judicium*, is an appeal to the common belief of mankind. *Argumentum a tuto* rests upon the supposed safety or prudence of adopting a certain conclusion. *Argumentum ad populum* is an appeal to popular passions or prejudices. *Argumentum ad ignorantiam* is an artful attempt to establish a statement by showing that we do not know the truth of its opposite. *Argumentum ad verecundiam* is an appeal to a reverend authority. Lastly, the *argumentum a baculo* is the use of the cudgel or of a browbeating manner to settle a dispute. This form of argument is concise in its style and has quickly adjusted many controversies.

**ARGUN**, är-gōōn'. A river of Asia, which unites with the Shilka at Ust-Strielka, on the borders of Siberia and Manchuria, to form the Amur. It rises on the northern borders of Mongolia and has a generally easterly course of about 1100 miles, in the lower half of which it forms the boundary between Trans-Baikalia and Manchuria. Not far from the middle point of its course it flows through a considerable lake called Dalai-Nor. In its upper course it bears the name of Kerulen.

**ARGUN KHAN**, är-gōōn' kän. See MONGOL DYNASTIES.

**AR'GUS** (Lat. for Gk. Ἄργος, *Argos*). 1. The son of Zeus and Niobe. He was the mythical ancestor of the Argives, and founder of Argos, and was worshiped at his grave, near that city. He was said to have introduced agriculture from Libya. 2. Argus, surnamed Panoptes ('all-seeing'), had 100 eyes, some of which were always awake. For his watchfulness Hera chose him to guard Io (q.v.), who had been transformed into a cow. Hermes, sent by Zeus to steal the cow, killed Argus by stoning him, or, in the later version, charmed all his eyes to sleep and struck off his head. Hera used the eyes of Argus to decorate the peacock's tail. 3. Argus, the builder of the ship *Argo*. (See ARGONAUTS.) 4. Argus (Argos) is also the name of several Greek cities, of which the most celebrated was the historic capital of the Argolic plain. (See ARGOLIS.) In Homer, Argos denoted the kingdom of Agamemnon, the entire Peloponnesus, and even the whole of Greece. 5. Argus, the dog of Odysseus, who after 20 years recognized his master on his return, in spite of his disguise, and died of joy.

**ARGUS, THE.** See ALLEN, WILLIAM HENRY.

**ARGUS PHEASANT**, fēz'ant. See PHEASANT.

**ARGYLL**, är-gīl', ARCHIBALD CAMPBELL, MARQUIS OF (1598–1661). A prominent Scottish nobleman. In his sixteenth year he saw service under his father, whom he succeeded, as eighth Earl, in 1638. Already he had given proofs of that strength of religious principle which marked his whole life, and of a perilous union of attachment to Charles I, and of faith in the principles against which the King made war. In the General Assembly at Glasgow, in November, 1638, he openly took the side of the Covenanters and thenceforth became recognized as their political head. In 1640 he commanded a military expedition through Badenoch, Athole, Mar, and Angus, for the purpose of enforcing subjection to the Scottish Parliament. The King, on his visit to Scotland in 1641, found it convenient to show peculiar favor to Argyll and created him a Marquis. On the breaking out of hostilities Argyll was still desirous for negotiation, but was finally compelled to take the field. In April, 1644, he dispersed the Royalist forces under the Marquis of Huntly in Aberdeenshire. He was less successful in withstanding the genius of Montrose, who, on Feb. 2, 1645, almost annihilated his army at Inverlochy. His estates had

suffered so much in the preceding year from the ravages of the brilliant Cavalier that a sum of public money was voted for his support. In August, 1646, he went to London, with Loudon and Dunfermline, to treat with the Parliament for a mitigation of the articles presented to the King. He was at the same time the bearer of a secret commission from the King to treat with the Duke of Richmond and the Marquis of Hertford on the propriety of a Scottish demonstration in favor of Charles. On the defeat of the "engagement" plan, to which he had been decidedly opposed, the government of Scotland devolved on Argyll and the other Presbyterian leaders. In the Parliament of February, 1649, Charles II was proclaimed King, and at Scone, on Jan. 1, 1651, Argyll put the crown on his head. At this time it was even said that the complaisant monarch intended to marry one of his daughters. As head of the committee of estates Argyll took vigorous measures to oppose Cromwell's invasion of Scotland, and still adhered to the King after the subjugation of the country. After the battle of Worcester he retired to Inverary, where he held out for a year against Cromwell's troops. Falling ill, he was taken prisoner by General Dean. He refused submission to the Protector, but made an engagement to live peaceably, which he strictly kept. On the Restoration he repaired to Whitehall, encouraged by a flattering letter from the King to his son. By order of Charles II he was committed to the Tower, and on Feb. 13, 1661, was brought before the Scottish Parliament on the charge of treason. He defended himself with spirit, but in vain; on the 27th of May he was executed at Edinburgh. Conflicting estimates of Argyll's character have been written; cowardice in the field has been proved against him, and Scott places him in an unfavorable light in his *Legend of Montrose*.

**ARGYLL,** ARCHIBALD CAMPBELL, ninth EARL OF (?–1685). Eldest son of the preceding. He was early distinguished by personal accomplishments and exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the Royalist side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to the Parliamentary leaders that he was specially excepted by Cromwell from the Act of Grace in 1654. After much harassing persecution he submitted to the Parliament but continued to be closely watched. On the restoration of Charles II he was received into high favor (as a balance to the execution of his father), and, unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish Legislature. He had, however, numerous and active enemies; and, on the ground of an intercepted letter, in which he had complained of neglect, he was tried and condemned to death by the Scottish Parliament for the imaginary crime of *læsa majestas*. The influence of Clarendon restored him to liberty and favor; even the King himself was prejudiced in his favor, but in taking the test oath framed by the Scottish Parliament in 1681, his added reservation, "So far as consistent with the Protestant faith," was declared treasonable, and he was again condemned to death. The devotion of his wife enabled him to escape from Edinburgh Castle in the disguise of a page, and, after remaining concealed some time, he fled to Holland. On the accession of James II he landed in the north of Scotland, in May, 1685, with an armed force, to coöperate in the revolt of Monmouth, but after a series of misfortunes, was taken prisoner, hastily condemned, and beheaded, June 30, 1685. His son Archibald, one of the deputation sent by the Scottish Convention to present the crown to the Prince of Orange, was in 1701 created Duke of Argyll. Consult John Willcock, *A Scots Earl in Covenanting Times; Being the Life and Times of Archibald Campbell, Ninth Earl of Argyll* (Edinburgh, 1908).

**ARGYLL,** GEORGE JOHN DOUGLAS CAMPBELL, eighth DUKE OF (1823–1900). He succeeded his father in 1847. At the age of 19, while Marquis of Lorne, he wrote a pamphlet entitled *A Letter to the Peers from a Peer's Son*, on the struggle which ended in the disruption of the Scottish Church. In 1848 he published an essay on presbytery, which contains an historical vindication of the Presbyterian system. On the formation of the coalition ministry by Lord Aberdeen he was invested with the office of Lord Privy Seal, which he continued to hold in Lord Palmerston's administration. In 1855 he relinquished his office and became Postmaster-General. In 1859, on Palmerston's return, he again accepted office. He was Secretary of State for India under Mr. Gladstone in 1868–74, and Lord Privy Seal in 1880–81; he resigned office in 1881, disapproving of the Irish Land Bill. In 1874 he had supported the abolition of patronage in the Church of Scotland. In 1854 he was chosen Lord Rector of the University of Glasgow; in 1855 presided at a meeting of the British Association in that city, and in 1861 was elected president of the Royal Society of Edinburgh. He was hereditary master of the Queen's household in Scotland, Chancellor of the University of St. Andrews, a trustee of the British Museum, also hereditary sheriff and Lord Lieutenant of Argyllshire. Besides numerous papers on zoölogy, geology, etc., he wrote *The Reign of Law* (1866); *Primeval Man* (1869); *A History of the Antiquities of Iona* (1871); *The Unity of Nature* (1884); a volume of poems, *The Burdens of Belief* (1894); and *Organic Evolution* (1898). Though Argyll is best known by *The Reign of Law*, which has become a classic in the defense of theism, all his work shows very great ability. He was also one of the most finished orators of his time. His autobiography has been edited by his widow (2 vols., London and New York, 1906).

**ARGYLL,** JOHN CAMPBELL, second DUKE OF (1678–1743). A Scottish general and statesman. He was the son of the first duke, and took an important part in the political and military affairs of his time. As royal commissioner in 1705, he had a principal share in bringing about the union of England and Scotland. As a soldier he distinguished himself under Marlborough at Ramillies, Oudenarde, Lille, Ghent, and Malplaquet. Previous to the change of ministry in 1710, Argyll had been a strong Whig. He now joined the Tories in opposing the Duke of Marlborough. As a reward he was appointed by the Tories generalissimo of the British army in Spain; but, considering himself to have been slighted by the ministry, he soon after returned, and finding his influence greatly diminished, he again became a Whig. His career up to the rebellion of 1715 was tortuous, and seriously detracts from his meritorious services during that critical period. He was, however, placed in command of the King's forces in Scotland and was completely successful in quelling the Jaco-

bite rising. His services were rewarded in 1718 with an English peerage and the title of Duke of Greenwich. In 1721 he again played into the hands of the Tories, for the purpose of securing the entire patronage of Scotland. He was made a field marshal in 1735. In 1737 he rose into immense popularity in his own country by his spirited defense before Parliament of the city of Edinburgh in regard to the Porteous mob. Pride and passion rather than ambition were the motives which chiefly controlled him. He was endowed with remarkable oratorical gifts, but the shiftiness of his policy prevented him from ever attaining a place commensurate with his seeming abilities. He was noted for his kindness and courtesy in private life. The benevolence of his disposition procured him the title of "the Good Duke of Argyll." Compare the flattering description of him in Scott's *Heart of Midlothian*. Consult also his *Life*, by Robert Campbell (1745).

**ARGYLL,** JOHN DOUGLAS SUTHERLAND CAMPBELL, ninth DUKE OF (1845–1914). An English statesman and author. He was born in London, and was educated at Eton, St. Andrews University, and Trinity College, Cambridge. He was returned to Parliament as a Liberal from Argyllshire, which he represented from 1868 to 1878. In 1871 he married Louise, fourth daughter of Queen Victoria. From 1878 to 1883, as Marquis of Lorne, he was Governor-General of Canada, his administration being markedly popular and successful. In 1895 he was returned to Parliament from South Manchester. He succeeded to the dukedom of Argyll in 1900. He published *A Trip to the Tropics* (1867); *Guido and Lita* (1875); *The Psalms Literally Rendered in Verse* (1877); *Imperial Federation* (1885); *Canadian Pictures* (1885); *Queen Victoria, Her Life and Empire* (2d ed., 1909); *Passages from the Past* (1908); *Yesterday and Today in Canada* (1910).

**ARGYLL AND THE ISLES,** JAMES ROBERT ALEXANDER CHINNERY-HALDANE, LORD BISHOP OF (1842–1906). A Scottish prelate. He was educated at Trinity College, Cambridge, took orders in 1866, and was curate of All Saints, Edinburgh, from 1869 to 1876. From 1876 to 1895 he was rector of Nether Lochaber, and in 1881–83 was Dean of Argyll and the Isles. In 1883 he became bishop. Among his publications may be mentioned *The Scottish Communicant; The Communicant's Guide; Charges on the Holy Eucharist and Kindred Subjects* (1883–87).

**ARGYLL'SHIRE** (*Argyle*, Gael. *Airer-Gaedhel*, district of the Gaels). A county in the west midland division of Scotland, bounded on the north by Inverness-shire; on the east by Perthshire, Dumbartonshire, and the Firth of Clyde; on the south by the Irish Sea; and on the west by the Atlantic Ocean (Map: Scotland, C 3). Its greatest length is about 115 miles; greatest breadth, about 55 miles; its extent of coast line is very great, amounting to 2289 miles, owing to the indentation of the coast by the numerous lochs. It is second only to Inverness in size, with an area of 3232 square miles, of which 616 are occupied by numerous islands. The chief of these are Jura, Mull, Islay, Tyree, Gigha, Coll, and Colonsay. The general aspect is wild and picturesque, marked by rugged and lofty mountains and deep inland bays. Some fertile valleys exist. Sheep raising is one of the chief industries. More sheep are pastured in Argyll than in any other county in Scotland, and nearly 1,000,000 acres are available for this purpose. Forests once partly covered the shire and abounded in game, and some of the lakes are famous for excellent fish. Quarrying and mining are also carried on. The chief towns and villages are Inverary, the capital, Campbelton, Oban, Dunoon, Lochgilphead, and Tarbert. Pop., 1801, 81,300; 1851, 89,300; 1891, 75,000; 1901, 73,642; 1911, 70,902, the decrease being due chiefly to emigration. Consult Campbell, *Records of Argyll* (Edinburgh, 1885).

**ARGYRO-CASTRON,** är'yē-rō'käs-trŏn. A town of Albania, in the vilayet of Janinà, on an affluent of the Viosa River, 90 miles southwest of Monastir. It has several mosques. Its population in the eighteenth century was above 20,000. A plague in 1814 was disastrous, and the inhabitants now number about 10,000

**ARGYROPULOS,** är'gē-rō-pōō'lŏs, JOHANNES (c.1416–86). A Greek humanist, who contributed largely to the revival of Greek learning in the West. He was born at Constantinople, but went to Italy at an early age, by 1441, and in 1456 was called by Cosmo de' Medici to the chair of Greek and the Aristotelian philosophy at Florence. There his pupils included Lorenzo and Pietro de' Medici, Politianus, Reuchlin, and Acciaioli. In 1471 he removed to Rome, where he died. His chief works were Latin translations of the *Ethics*, *Politics*, *Œconomics*, *De Anima*, and *De Cœlo* of Aristotle, and a commentary on the *Ethics* of that philosopher.

**ARIA,** à'rē-à *or* ā'rī-a, or **AIR** (It. from Lat. *aer*, Eng. *air*, in the meaning style, manner; for similar development of meaning, cf. *modus*, mode, musical mode). An elaborate lyrical composition for a solo voice with accompaniment of the orchestra. Usually it is a number from an opera or an oratorio, but there exist also independent arias written for concert performance. Such are called *concert arias*. The difference between an aria and a ballad (q.v.) is that the former is always lyric, the singer expressing his emotions in the first person, whereas the latter is epic, the singer narrating in the third person. Broadly speaking, the aria differs from the song (lied) by the fact that it has orchestral accompaniment, while the song is written with accompaniment for a single instrument, usually the piano. In view of the enormous development of the modern song it can no longer be maintained that the aria is conceived along grander lines. Richard Strauss's *Cäcilie* is a "song" because it has piano accompaniment; but in grandeur of conception and intensity of utterance it surpasses many arias. In fact, the composer subsequently orchestrated it, and in this form it is one of the finest arias in the range of musical literature.

The form of the aria originated in Italy, and its development goes hand in hand with the evolution of the monodic style (see MONODY) of the Italian opera. The earliest example of the so-called *aria grande* or *aria da capo* is found in the opera *Gerusalemme liberata* (1686) by Pallavicini (q.v.). The form is binary; a first theme is followed by a second theme, after which the first theme is repeated; whence the term *aria da capo*. The whole is preceded by an orchestral introduction, called *ritornello*, which consists of the first theme. Alessandro Scarlatti (q.v.), to whom for a long time has been erroneously ascribed the invention of this form, uses it for the first time in his *Teodora* (1693). For the sake of contrast and better effect, how-

ever, he wrote the first theme as an allegro and the second as a slow movement, in which form the aria has become typical. In the course of the eighteenth century the last portions, especially the repetition, became more and more overloaded with meaningless ornamentation, the object of which was only to gratify the vanity of the singers in the exhibition of vocal feats. Before long the sole interest in opera was centred upon the aria, and both composers and audience lost all sense of dramatic truth. Thus the aria was the prime factor that caused the decadence and final disappearance of the operatic school known as that of the *bel canto*. From the middle of the eighteenth century on this form of the aria was designated as *aria di bravura*, or *aria di oloratura*. The true instinct of such masters as Gluck, Mozart, and Weber led them to reject all useless cadenzas, and especially the literal repetition of the first theme, as undramatic. Wagner rejected the entire form.

*Aria da chiesa* is an aria on a sacred text. It bears the same relation to the sacred song as the concert aria to the secular song. In the *aria parlante* the flowing melody is mingled with a more declamatory style approaching the recitative. An *arietta* is an aria on a smaller scale, often without a contrasting second theme, even with only piano accompaniment. An *arioso* is a recitative occasionally interrupted by real melodic outbursts. It is frequently synonymous with *aria parlante*.

**A'RIAD'NE** (Gk. Ἀριάδνη). A daughter of Minos, King of Crete, by Pasiphaë. In the earliest form of the story Ariadne, while on her way to Athens with Theseus, was killed by Artemis (*Odyssey*, xi, 321 ff.). The more common version told how, when Theseus landed in Crete with the offerings for the Minotaur, Ariadne loved the youthful stranger and enabled him to slay the monster and escape from the labyrinth. Theseus secretly carried her with him from Crete, but abandoned her on the island of Naxos. The earlier writers seem to have attributed this desertion to the will of Dionysus, while later the faithlessness of Theseus was made prominent. Dionysus found the deserted Ariadne and made her his bride, placing her crown among the stars. Ariadne, as left forsaken by Theseus, and as found and married by Dionysus, has been a favorite subject with artists.

**A'RIAL'DUS.** A deacon of the Church of Milan, who flourished during the eleventh century and was called the Patarene, an opprobrious epithet, meaning 'the ragpicker,' because his followers assembled in the slum quarter of Milan, where the ragpickers lived. He led them in vigorous protest, even insurrections, against the marriages and incontinence of the clergy and in support of the strict enforcement of clerical celibacy. Although successively sanctioned by Popes Stephen IX (1057–58), Nicholas II (1059–61), and Alexander II (1061–73), he found little sympathy among his brethren, and used to complain that he could get only laymen to assist him in his agitation. Having at length succeeded in obtaining a papal bull of excommunication against the Archbishop of Milan (1065), a fierce tumult ensued in the city, whose inhabitants declared against Arialdus and his coadjutors, not because they opposed clerical marriages, but because they seemed to be bent on subjugating the Church of Milan to Rome. Arialdus now fled to the country, but, his hiding place being betrayed, he was conveyed captive to a desert isle in Lake Maggiore, where he was murdered by the emissaries of the Archbishop, and his remains thrown into the lake, June 28, 1065. He was afterward canonized by Pope Alexander II.

**ARIANE,** a'rē-an'. One of Corneille's less excellent tragedies, composed in his period of decline, in 1672, and founded on Ariane's (Ariadne's) adventures after her unhappy marriage with Theseus.

**A'RIANISM.** See ARIUS.

**ARIANO,** ä'rē-ä'nō (anciently, Lat. *Arianum*). An episcopal city in the province of Avellino, south Italy, built on a rocky height of the Apennines, 17 miles east of Benevento (Map: Italy, K 6). In the limestone of the surrounding mountains caves have been hollowed out, in which many of the poorer people dwell. The region is fertile, and the chief manufacture is earthenware. Pop., 1881, 14,398; 1901, 17,650; 1911, 17,625.

**A'RIANS.** See ARIUS; HERESY; HERETICS.

**ARIAS,** ä'rī-*as*, BENEDICTUS, surnamed MONTANUS (1527–98). A Roman Catholic divine noted for his great linguistic attainments. He was born at Fregenal de la Sierra, Spain. He studied first at Seville and afterward at Alcalá de Henares, where he distinguished himself by the ardor he manifested in the acquisition of the Semitic Oriental languages. He next proceeded on a tour through Italy, France, Germany, England, and the Netherlands, in the course of which he obtained a knowledge of various modern tongues. He joined the knightly Order of St. James as a priest, and as theologue of Bishop Martin Perez Azala, of Segovia, attended the Council of Trent; but on his return home he resolved to retire into seclusion at Aracena and dedicate his whole time to literature. In 1568, however, Philip II persuaded him to repair to Antwerp and superintend the publication of the famous edition of the Polyglot Bible, executed in that city at the suggestion of the printer, Christopher Plantin. After four years' labor the work was issued under the title *Biblia Sacra, Hebraice, Chaldaice, Græce et Latine, Philippi II Regis Catholici Pietate et Studio ad Sacrisanctæ Ecclesiæ Usum. Cliph. Plantinus excudebat* (8 vols., folio, Antwerp, 1569–73). Only 500 sets were printed, and the greater part of them were lost at sea, on their way to Spain. It was received with universal applause. The Jesuits, to whom Arias was sincerely and strenuously opposed, alone attempted to fasten the charge of heresy on the author because he had included so much rabbinical matter, and he made several journeys to Rome to clear himself of the accusation. Philip II rewarded him with a pension of 2000 ducats, besides bestowing on him various other emoluments—as court chaplain and librarian at the Escurial. He died at Seville in 1598. His literary works are very numerous. They relate principally to the Bible and to Jewish antiquities; but he also wrote numerous Latin poems and a history of nature. For his biography and portrait, consult *Memorias de la real Academia de la Historia*, vol. vii (Madrid, 1832), and Gorris, *Vie d'Arias Montano*, (Brussels, 1842).

**ARICA,** ä-rē'kä. A seaport town of north Chile, situated in the province of Tacna, about 40 miles by rail from Tacna, the capital of the province, and near the mouth of the Lluta (Map: Peru, C 7). It has a safe roadstead and is 2100 miles from Panama. This port is connected by

road and rail with the interior and is an outlet for Bolivian trade. It exports gold, copper, silver, tin, alpaca, wool, sulphur, saltpetre, and guano. The population, estimated at the time of the Spanish régime at 30,000, was, at the census of 1903, only 2877. An enumeration in 1909 returned 4300. Arica was discovered in 1579 by Sir Francis Drake. It has suffered considerably from earthquakes, that of 1868 being most destructive. During the war between Chile and Peru the town was bombarded by the Chilean forces and was transferred to Chile in 1883 along with the province of Tacna (q.v.). Consult Paz Soldan, *Historia de la guerra entre Perú y Chile*.

**ARICHAT,** ä'rē-shät'. A seaport on Madame Island, Nova Scotia, the capital of Richmond County, on the Cape Breton Railroad. The town is the see of a Roman Catholic episcopate and, with West Arichat, numbers about 2500 inhabitants, engaged in fishing and canning and in commerce in agricultural products. The harbor accommodates the largest vessels. The United States is represented by a consular agent.

**ARICI,** â-rē'chê, CESARE (1782–1836). An Italian poet born at Brescia. He studied at Milan and was secretary of the departmental court at Brescia under Bonaparte. He was appointed professor of eloquence in the lyceum at Brescia in 1810, subsequently professor of history and literature and in 1824 professor of the Latin language. His principal work is the didactic poem *La coltivazione degli olivi* (1808), which won for him an important place in Italian literature. He also wrote another didactic poem, *La pastorizia* (1814), and some shorter poems, such as *Il campo santo di Brescia*, and made a translation of the *Bucolics* and *Æncid* of Vergil.

**ARI'CIA.** One of the oldest towns of Latium in Italy on the Appia Via (q.v.), at the foot of the Alban Mount, 16 miles from Rome, known now as Ariccia. As early as the time of the kings the city was of importance. In 338 B.C. it was conquered by C. Mænius and became a *civitas sine suffragio;* later, it became a *municipium* (q.v.). Near the town was a steep hill, often mentioned in Latin writers as the gathering place of beggars, who bothered the occupants of the carriages as they crawled up the hill. Near the town lay Lake Nemi.

**ARICINI.** The people of Aricia.

**AR'ID RE'GIONS.** See DESERT.

**ARIEGE,** a'rê-âzh'. A border department of France lying along the northern slopes of the Pyrenees (Map: France, S, F 5). In the south several peaks rise to a height of nearly two miles, and their summits are perpetually snow-clad, but the northern part of the department is a low fertile plain. The chief industries are grazing, agriculture, iron, copper, and lead mining, and the manufacture of woolens, linens, and pottery. Capital, Foix. Area, 1893 square miles. Pop., 1896, 219,641; 1911, 198,725. Consult H. L. Duclos, *Histoire des Ariégeois* (7 vols., Paris, 1881–87).

**ARIEGE** (anciently, Lat. *Aurigera,* gold-bearing). A tributary of the Garonne (q.v.) which rises in the Pyrenees, in southern France, and flows northward to join the Garonne above Toulouse. It is 95 miles long and of little commercial importance.

**A'RIEL.** 1. An Arabian antelope. (See GAZELLE.) 2. A toucan. See TOUCAN.

**ARIEL.** 1. The name given in the Revised Version of the Bible to the father of two Moabitish youths slain by Benaiah, one of David's "mighty men" (2 Sam. xxiii. 20). 2. One of a delegation sent by Ezra (Ezra viii. 16). 3. Jerusalem (Isa. xxix. 1, 2, 7). 4. In later Jewish angelology, the name of a water spirit. 5. A guardian of the waters in mediæval black art, several times introduced into English poetry. The character first appears in Shakespeare's *Tempest,* where he is described as an "ayrie sprite," Prospero's servant. In Milton's *Paradise Lost* he assumes the more grandiose proportions of a fallen angel. In Pope's *Rape of the Lock* he is a minute and invisible guardian of Belinda's head-dress.

**ARIES,** ā'rī-ēz. See BATTERING RAM.

**ARIES** (Lat. the Ram). One of the signs of the zodiac, including the first 30° of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place; its conventional symbol is ♈, representing the head of a ram. The vernal equinox, or, as it is also called, the first point of Aries, is constantly changing its position among the fixed stars, in consequence of the precession of the equinoxes, moving westward at the rate of 50".2 annually. It is from this circumstance that the sign Aries no longer corresponds with the constellation Aries, or the Ram, which was the case about 2000 years ago, when the ecliptic was divided into 12 equal parts called signs, each named after the group of stars through which it passed. The present sign Aries is in the constellation Pisces, about 30° west of the original sign; and although the sun when passing the vernal equinox will always be at the first point of the sign Aries, yet nearly 24,000 years will elapse before that point will again coincide with the beginning of the constellation Aries. See ECLIPTIC; PRECESSION; ZODIAC.

**A'RIET'TA.** See ARIA.

**ARIKARA,** â-rē'kâ-râ. A tribe of Caddoan stock now confederated with the Mandans and Hidatsa on the Fort Berthold Reservation in North Dakota and numbering about 400. They are a northern offshoot from the Pawnee (q.v.), of whose language their own is practically a dialect. About the year 1780 they occupied several villages some 500 miles lower down the Missouri River, but were driven out by the Sioux, since which time they have rapidly declined. Their tribal name, often abbreviated to Ree, seems to be from the same root as *Pawnee.* Consult Dorsey, *Traditions of the Arikara* (Washington, 1904).

**AR'IL** (LL. nom. pl. *arilli,* dry grapes; from Lat, *aridus,* dry). An extra investment of the seed, outside the ordinary testa. It may be a more or less complete investment and is often fleshy. For example, the aril of the yew (*Taxus*) is a beautiful, scarlet, fleshy cup, which gives the seed the appearance of a berry. See SEED.

**AR'IMATHÆ'A** (Gk. 'Αριμαθαία, *Arimathaia*). The home of Joseph, the Jewish councilor who favored Jesus (Matt. xxvii. 57; Mark xv. 43; Luke xxiii. 51; John xix. 38). Its situation is not certainly known, but was probably the same as that of Ramathaim-zophim, or Ramah, the home of the prophet Samuel in the hill country of Ephraim (1 Sam. i. 1, with 19), the modern *er Râm,* about 19 miles northwest of Jerusalem.

**ARI'MINUM.** See RIMINI.

**AR'INO'RI MO'RI.** See MORI, ARINORI.

**AR'IOBARZA'NES** (Gk. *'Αριοβαρζάνης*). The name of satraps or kings of ancient Pontus. 1. Father of Mithradates I, who betrayed him to the Persian King about 400 B.C. 2. Son of Mithradates I, who reigned 363–337 B.C. In 362 he rebelled against Artaxerxes and became the founder of the kingdom of Pontus. 3. Son of Mithradates III, King of Pontus 266–240 B.C. He helped to call the Gauls into Asia. See GALATIA.

The name "Ariobarzanes" was borne also by rulers or kings of Cappadocia. 1. King from 93 to 63 B.C., though he was thrice expelled during that period by Mithradates the Great. He was finally restored by Pompey in 63. He was known as *Philoromæus*. 2. Son of the preceding, who abdicated in his favor shortly after his final restoration by Pompey. 3. Son and successor of the preceding, from 51 B.C. He assisted Pompey against Cæsar, but Cæsar pardoned him and enlarged his domain. He was put to death by Cassius in 41 B.C. He too was known as *Philoromæus* and as *Eusebes*.

**ARIOCH,** ā'rĭ-ŏk. King of Ellasar, according to Gen. xiv. He may be identical with Rim Sin, King of Larsa, a son of Kudur Mabuk, King of Elam at the time of Hammurabi (c.2124–2081 B.C.). As in the case of Chedor Laomer (q.v.), the name is compounded with that of an Elamitish divinity. According to an inscription (British Museum, 11,680) (ilu) Aku is identical with (Ilu) Sin, the moon-god. *Rim* may have been pronounced *riw*, and an *a* is often prefixed. Rim Sin was a younger brother of Arad Sin. The latter reigned as vassal king in Larsa under his father, Kudur Mabuk. It has been conjectured that Kudur Mabuk was succeeded by a king named Kudur Lagamar. But this king has not yet been found in any inscription. In Dan. ii. 14 Nebuchadnezzar's captain of the guard is named Arioch, which shows that in 165 B.C. the story in Gen. xiv. was already known. Arioch is an Elamitish king in league with Nebuchadnezzar in the story of Judith (i. 6). See Dhorme in *Revue Biblique,* 205 ff. (1908).

**ARI'ON** (Gk. *'Αρίων, Arión*). A celebrated lute player of Methymna, in Lesbos, who lived at the time of Periander, tyrant of Corinth. According to Herodotus (i, 23 ff.; see also Aulus Gellius, *Noctes Atticæ* xvi, 9), Arion, while dwelling at the court of Periander, paid a visit to Sicily and lower Italy. When on his way back by sea, the sailors of the vessel on which he had taken passage plotted to slay him and seize his possessions. Arion begged permission to try once more his skill in music and, having been allowed to do so, threw himself at the close of his strain into the sea. Several dolphins, charmed with the music, had assembled around the vessel, and on the back of one of these he was carried in safety to Greece. The sailors, on their return, were confronted with Arion and paid the penalty of their intended crime. Another account makes the rescue take place while Arion was on his way from Corinth to Methymna. In the days of Herodotus and Pausanias there existed at Tænarum, where Arion was said to have landed, a bronze monument, representing Arion riding on a dolphin, which was supposed to be a thank offering made by Arion to Poseidon. The lute and the dolphin were put among the constellations. Arion was regarded as the inventor of the dithyramb. He may have given it its artistic form, but even so much is doubtful. See DITHYRAMBUS.

**ARION** (Gk. *'Αρείων, Areiōn*). A marvelous horse, the offspring of Poseidon by either Demeter, Gæa, or a harpy, the mother having futilely changed herself into a mare to escape the sea god's addresses. Driven, at different times, by Copreus, Oncus, Hercules, and Adrastus, it yet possessed astounding evidences of its divine origin. It had full power of speech, and its right feet were those of a man.

**ARIO'SO.** See ARIA.

**ARIOSTO,** ăr-yōs'tō, LODOVICO (1474–1533). One of the most celebrated of Italian poets, the author of the *Orlando Furioso,* and, with Boiardo and Tasso, one of the trio who showed Italy how the material of the old chivalric romances might be remodeled and endowed with classic form and epic dignity. He was born Sept. 8, 1474, at Reggio, where his father was then military governor. Like Petrarch and Boccaccio before him, he was destined by his father for the law, but abandoned it after five years of half-hearted study. His father's early death (1500) transferred to Ariosto's shoulders the burden of a large family, with but a scanty inheritance; and in 1503 he was glad of the chance offered him to enter the service of Ippolito, the Cardinal d'Este, brother of the Duke of Ferrara. By this time he had already acquired a reputation for his verses, in both Latin and Italian; but his new position was far from favorable to poetic inspiration. The Cardinal, a rough, coarse-natured man, quite destitute of poetic feeling, kept Ariosto actively employed upon diplomatic errands to Rome or upon distant embassies, and on one occasion at least, sent him into active service against the Venetians. It was, however, during the 10 years that Ariosto spent in his service that the *Orlando Furioso* was written, and it was finished in the latter part of 1515 and published at Ferrara, 1516, in 40 cantos. Ostensibly it was a continuation of Boiardo's *Orlando Innamorato;* practically, it was a glorification of the House of Este, having for its real hero Ruggiero, the mythical founder of that house. In payment for this rather obvious flattery, the Cardinal is said to have rewarded him with a golden chain and the query, "Where had he got that rubbish?" and the following year, having incurred his patron's displeasure by a refusal to accompany him to Hungary, Ariosto passed into the service of his brother, the Duke of Ferrara. The Duke, scarcely more munificent than the Cardinal, bestowed upon him the governorship of the wild mountain district of Garfagnana (1522), overrun with bandits, which, with all his endeavors, he could not succeed in reducing to order. He was finally recalled by the Duke in 1525 and spent his remaining years in Ferrara, nominally in his patron's service, but in reality enjoying what he prized most highly—abundant leisure for prosecuting his studies, in the modest home which the Latin inscription over the door proudly states was bought from his own savings. This house is still carefully preserved by the authorities of Ferrara. He died in that city, June 6, 1533, and was buried there in the church of San Benedetto.

The manner in which the *Orlando Furioso* is engrafted upon Boiardo's earlier poem has been aptly compared to the connection between the *Iliad* of Homer and the *Æneid* of Vergil. Boiardo's poem was based upon the chivalric cycle which dealt with the wars between Charlemagne and the Saracens, confounded with those of

Charles Martel, in which Orlando, or Roland, stood forward as champion of Christendom. Orlando is Boiardo's hero, and falls in love with Angelica, a clever and beautiful Oriental princess sent by the Paynim to sow discord among the Christian knights. The story, left unfinished by Boiardo, is taken up by Ariosto, who makes Angelica fall in love with an obscure young squire whereupon Orlando becomes insane. It is difficult, however, to disentangle the central argument of this poem from the mass of irrevelant episodes in which it is involved. The *Orlando Furioso* has long been numbered among the world's greatest epics, but it is utterly lacking in epic unity, and probably its nearest parallel is that pointed out by Richard Garnett—Ovid's *Metamorphoses*. In so far as it has a central theme at all, it is not the adventures of the knight who has given it his name, but Ruggiero's conversion from paganism, his union with Bradamant, and the incidental exaltation of the House of Este. Ariosto also left comedies, satires, sonnets, and a number of Latin poems. There are also extensive fragments of another epic, *Rinaldo Ardito*, which are attributed to him; but it is a question whether they are not rather the work of his son Virginio.

The first edition of the *Orlando Furioso*, in its present dimensions of 46 cantos, was published at Ferrara in 1532. Recent editions are those edited by Casella (Florence, 1877), and Papini (Florence, 1903), and an *édition de luxe*, with introduction by Carducci and illustrations by Doré (Milan, 1880). The latest edition of his lesser works, *Opere minori in verso e in prosa*, is that of Polidori (2 vols., Florence, 1894). The latest and most complete biographies are by A. Cappelli, in his collection of Ariosto's *Letters* (Milan, 1887); Giosuè Carducci, *Studi su Ludovico Ariosto e Torquato Tasso* (Bologna, 1905); and Gardner, *The King of Court Poets: Ludovico Ariosto* (New York, 1906). Of translations the following into English may be mentioned: by Sir John Harrington (London, 1591); John Hoole (London, 1783); and the much more spirited version of W. Stewart Rose (London, 1823). Consult De Sanctis, *Storia della Letteratura Italiana*, ed. by Benedetto Croce, vol. ii (Bari, 1912).

**ARIOSTO OF THE NORTH.** A title given to Sir Walter Scott, suggested by the legendary subject-matter and the romantic manner of treatment which the English and the Italian poet are alike in employing.

**A'RIOVIS'TUS** (OHG. *heri, hari*, Ger. *Heer*, army, and *furist*, Ger. *Furst*, chief). A German chief. He was the leader of the Suevi and other German tribes, and was requested by the Sequani, a Gallic people, to assist them in a contest against the Ædui. Having gained a victory for the Sequani, Ariovistus was so well pleased with their country (now Burgundy) that he determined to abide there with his followers. Many other Germans followed him into Gaul, where he soon collected an army of 120,000 men. The Gallic people now turned for help to the Romans, and Cæsar demanded an interview with Ariovistus, who proudly replied that "he did not see what Cæsar had to do with Gaul." After another message from Cæsar had been treated in the same scornful manner, the Roman forces under Cæsar advanced and occupied Vesontio (now Besançon), the chief city of the Sequani. A furious engagement took place 58 B.C., in which Roman discipline prevailed over the German forces, which were utterly routed. Ariovistus, with only a few followers, escaped over the Rhine into his own country. His subsequent history is unknown. Consult Cæsar, *De Bello Gallico*, book i, T. Rice Holmes, *Cæsar's Conquest of Gaul* (2d ed., Oxford, 1911).

**ARIPA,** ä-rē'pa. A division of the Kalinga tribe which formerly lived near Tubang, Cagayan Province, Luzon. They have now lost their identity. See PHILIPPINES.

**ARIS'TA.** See GRAMINEÆ.

**ARISTA,** a-rēs'tà, MARIANO (1802–55). A Mexican general. He was in command of the Mexican Army of the North in 1846 and was badly defeated by General Taylor at Palo Alto (May 8) and Resaca de la Palma (May 9). He was Minister of War in 1848 and was elected President of Mexico in 1851, but resigned in 1853 to avert an impending revolution and was banished soon afterward. He died in Europe

**AR'ISTÆN'ETUS** (Gk. *'Αριστaίνετος, Aristainetos*) (?–c.484 A.D.). A Greek epistolary writer. He is thought to be the author of two books of love stories in the form of letters (*'Επιστολαὶ 'Ερωτικαί, epistolai erōtikai*), imitations of Alcephron, and taken almost entirely from Plato, Lucian, Philostratus, and Plutarch. They have been edited by Boissonade (1822), and the text and a Latin version are contained in the Didot collection of the *Epistolographi Græci* (1873). Among English translations is that of Thomas Brown (1715). Aristænetus should not be confused with Aristænetus of Nicæa.

**AR'ISTÆ'US** (Gk. *'Αριστaῖος, Aristaios*). An ancient divinity whose worship in the earliest times seems to have been widely diffused throughout Greece, but who is known only in scattered and fragmentary traditions. According to the common tradition, he was the son of Apollo and Cyrene, the latter the granddaughter of Peneus, a river god of Thessaly. She is said to have given birth to Aristæus on the coast of Libya, in Africa, whence the region is alleged to have derived its name of Cyrenaica. Hermes placed the child in the care of the Horæ and Gæa (earth). Another version placed his birth in Thessaly and made him a pupil of Chiron the centaur. He appears at Thebes in Bœotia as son-in-law of Cadmus and father of Actæon (q.v.). Still another story brings him from Arcadia to the island of Ceos, where he was honored as having freed the island from the heat of the dog star by erecting an altar to Zeus Icmæus, the rainmaker, who rewarded this piety by sending the Etesian winds. Aristæus also appears in Corcyra, Eubœa, Sicily, and even Thrace, where he is one of a band of Dionysus. These stories are obviously not fragments of a connected narrative, but rather a number of local traditions connected with a divinity known as "the Good," whose very transparent name prevented his attaining the rank of a great god, though many of his activities are those attributed to Zeus and Apollo. He is connected with the life and interests of hunters and herdsmen, taught bee keeping, the care of the olive tree, and the spinning of wool, and introduced to Cyrene its valuable plant, silphium (asafœtida). In the fourth book of the *Georgics* Vergil describes how, when Aristæus lost all his bees, at the bidding of his mother he consulted Proteus (q.v.), to learn how he might replenish his stock. Proteus told him that Orpheus was angry with him, because

Eurydice had been slain by a snake while she was fleeing from Aristæus; he must therefore appease the nymphs by a sacrifice of cattle. He did so, and from the carcasses came forth bees. The telling of the Aristæus tale involves the recital by Vergil of the story of Orpheus and Eurydice. Ancient authorities say that, originally, his part of the *Georgics* contained the praises of Cornelius Gallus; but that when the latter lost the favor of Augustus, Vergil substituted the Aristæus story.

**AR'ISTAG'ORAS** (Gk. *'Αρισταγόρας*) (?–497 B.C.). A tyrant of Miletus and brother-in-law of Histiæus. During the stay of Histiæus at the Persian court Aristagoras was made governor of Miletus, and in 500 B.C. made an unsuccessful attack on Naxos, which he had promised to subdue for the Persians. Fearful of the consequences of his failure, he induced the Ionian cities to revolt from Persia, and, after vainly applying to Sparta for aid, obtained troops and 20 ships from the Athenians. The allies captured and burned Sardis (499 B.C.), but were finally driven to the coast by the Persians, and Aristagoras, in despair, fled to Thrace, where he was slain by the Edonians. Consult G. B. Grundy, *Great Persian War* (London, 1901).

**AR'ISTAR'CHUS** (Gk. *'Αρίσταρχος, Aristarchos*) OF SAMOS. A celebrated ancient astronomer of the Alexandrian school, who made his observations about 280–264 B.C. All his writings have perished, excepting a short essay on the sizes and distances of the sun and the moon. In this he shows the method of estimating the relative distances of the sun and moon from the earth, from the angle formed by the two bodies at the observer's eye when the moon's phase reaches exactly the first or third quarter, i.e., when we see a half moon. Remembering that the moon's light is simply reflected solar light, it is easy to see from the annexed figure that the three bodies must then form a right-angled triangle, with the moon at the right angle. The angle *MES* being then observed, we can readily calculate the ratio *EM* to *ES*. This is quite correct in theory; but the impossibility of determining when the moon is exactly half illuminated renders the method inaccurate in practice. Besides, in the days of Aristarchus there were no instruments for measuring angles with anything like accuracy. Aristarchus estimated the angle at *E* at 83° and determined *EM* to be one-twentieth of *ES*, the truth being that the angle at *E* differs only by a fraction of a minute from a right angle, and that *EM*, the distance of the moon from the earth, is about 1-400 of *ES*, the distance of the sun. According to some accounts, Aristarchus held, with the Pythagorean school, that the earth moves around the sun. Vitruvius speaks of Aristarchus as the inventor of a kind of concave sundial. His essay was first published in Latin by Valla (Venice, 1498), then in Greek and Latin by Wallis (Oxford, 1688), and it has since been republished. Consult Heath, *Aristarchus of Samos, the ancient Copernicus* (Oxford, 1913).




**ARISTARCHUS** OF SAMOTHRACE (c.220–145 B.C.). A Greek scholar. He was the pupil of Aristophanes of Byzantium, became tutor to the son of Ptolemy Philometor, and succeeded his master as head of the Alexandrian Library. He died in Cyprus. Aristarchus represents the highest attainments of philological criticism in antiquity, and his influence dominated all later workers. He put the study of grammar on a sound basis; he was one of the first to recognize definitely eight parts of speech. In grammar he was an analogist. (See ANOMALISTS AND ANALOGISTS.) He gave his attention chiefly to exegesis of the poets, particularly of the Homeric poems; his recension is the basis of our common text of Homer to-day. He wrote an enormous number of exegetical works—according to Suidas over 800—and many special treatises besides. Fragments of his comments are preserved, e.g., in the Venetian scholia to the *Iliad*. He founded a school of *Aristarcheans* at Alexandria, which continued to work on classical texts until after the beginning of the Empire. For an account of Aristarchus's Homeric studies, consult Lehrs, *De Aristarchi Studiis Homericis* (Königsberg, 1882). Consult also Sandys, *A History of Classical Scholarship*, i, 131–136 (Cambridge, 1906); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1891–92).

**ARISTE**, à'rēst'. A male character in Molière's *Les femmes savantes*, the common-sense brother of Chrysale. He befriends the lovers and, through his pardonable falsehood concerning Chrysale's financial loss, exposes the knavery of Trissotin.

**ARIS'TEAS** (Gk. *'Αριστέας*). An officer at the court of Ptolemy Philadelphus. He is said to have been sent by the latter to Jerusalem in 273 B.C., where he obtained from the high priest Eleazar a genuine copy of the Pentateuch and a body of 72 elders who translated it into Greek in 72 days. All this is narrated in a letter by an Aristeas to his brother Philadelphus, but the writer probably belongs to a later time (200 B.C.). Consult: Hody, *De Bibliorum Textu Originali* (Oxford, 1705); Dale, *Dissertatio super Aristea* (Amsterdam, 1705); Schürer, *Geschichte des jüdischen Volkes*, ii, 819–824 (1886). See BIBLE, IV (A).

**ARIS'TEAS** (Gk. *'Αριστέας*). A magician of antiquity who rose after his death, and whose soul left and reëntered his body according to its pleasure. (Consult especially Herodotus, iv, 13–15.) His earliest appearance is as the teacher of Homer. We also hear of him as having been born, at a period later than Homer, at Proconnesus, an island in the Propontis. He is said to have traveled through the countries north and east of the Euxine and to have visited the Arimaspi, the Cimmerii, the Hyperborei, and other mythical nations, and after his return and subsequent disappearance to have written an epic poem in three books, called *Arimaspia*, a composition belonging probably to the sixth century B.C. Aristeas is fabled to have entered a fuller's shop at Proconnesus and to have died there. Later a traveler appeared who said that he had met him on the road between Cyzicus and Artace. When the fuller's shop was entered, no body was found. It was seven years after this strange disappearance that he reappeared at Proconnesus and wrote the *Arimaspia*. He then vanished once more, to reappear for the second time 240 years later at Metapontum, in Italy. He advised the people of Metapontum to build an altar to Apollo, and by its side a statue of himself, saying that he

had been present, in the form of a raven, when the god founded the city. Herodotus declares that in his day there was in the Forum of Metapontum a statue of Aristeas beside an altar of Apollo. Later accounts tell other wonderful stories of Aristeas. Consult E. Rohde, *Der griechische Roman* (Leipzig, 1900).

**ARISTIDES,** ăr'ĭs-tī'dēz (Gk. *Ἀριστείδης, Aristeidēs*), called THE JUST (c.550–467 B.C.). An Athenian statesman. He was the son of Lysimachus and was descended from one of the best families in Athens. At the battle of Marathon (490 B.C.) he was one of the 10 Athenian generals who held command successively, each for a single day. In the following year he was chief archon. His policy in state politics was opposed to that of the other great statesman of his time, Themistocles, and the rivalry between these two became so pronounced that the Athenians, in order to obtain quiet, finally resorted to ostracism (q.v.). Aristides was banished, and retired to Ægina, Athens's bitter enemy, apparently in 484. The story is told that on the day of voting an ignorant citizen, personally unknown to the statesman, requested Aristides himself to write the name "Aristides" on the ostrakon. When Aristides asked him why he was voting so, he answered: "Because I am tired of hearing him always called *The Just.*" Four years later, when Xerxes invaded Greece, a general amnesty for all exiles was declared by Athens, and in consequence Aristides joined the Athenian fleet at Salamis and took a prominent part in the battle that followed. Being thus restored to favor, he was appointed commander of the Athenian troops that fought at Platæa in 479. In 477 he was joint commander with Cimon of the Athenian contingent in the combined Greek fleet which was engaged in driving the Persians from the Greek cities on the coast of the Ægean Sea. After the fall of Pausanias, he took the chief part in organizing the Delian League (see DELOS). It is said that after the battle of Platæa he carried through a law opening the archonship to the whole body of Athenian citizens. He died poor, in 467, leaving a son and two daughters. His body was carried from Pontus to Athens and buried at Phalerum, at the cost of the state. His life, by Plutarch, was well translated by B. Perrin, *Plutarch's Themistocles and Aristides* (New York, 1901).

**ARISTIDES,** ÆLIUS (129–189). A Greek rhetorician, surnamed Theodorus, son of Eudemon, a priest of Zeus, born at Hadrianoi in Mysia. He enjoyed the teaching of the most famous rhetoricians of his day, Aristocles in Pergamus and Herodes Atticus in Athens; in grammar and literature he was trained by Alexander of Cotyæum, whom he honored with a eulogy still extant. He traveled extensively in Egypt, Asia, Greece, and Italy, exhibiting his art as a speaker. While in Rome in 156 he was attacked by a severe illness, which troubled him 17 years with slight interruptions; yet he seems to have continued his vocation in spite of it. He stood in such favor with the Emperor Marcus Aurelius that he secured the rebuilding of Smyrna at the imperial expense after its destruction by an earthquake in 178. Ascribed to him we have two rhetorical treatises and 55 speeches, but it is not entirely certain that the treatises are from his hand. Of these some are eulogies on deities and cities (e.g., Rome and Smyrna), others declamations like his *Panathenaicus,* modeled on Isocrates's oration with the same title. Interesting also are the six *Sacred Speeches* (*Ἱεροὶ Λόγοι*) which report the suggestions made by Æsculapius through his priests for the rhetorician's recovery. All these writings were edited by Dindorf (3 vols., Leipzig, 1829). In style he was a strict Atticist, imitating successfully the best Attic writers. Consult Sandys, *A History of Classical Scholarship,* vol. i (Cambridge, 1906).

**ARISTIDES** OF THEBES. A Greek painter of the time of Apelles, about the middle of the fourth century B.C. He was a son and pupil of Nicomachus. He was noted for power of expression in his work, one of his finest pictures being that of a babe approaching the breast of its mother, who had been mortally wounded at the capture of a city, and whose face showed her fear lest the child should find blood instead of milk. His works were bought at enormous prices, and one of them was the first foreign painting ever exhibited to the public in Rome. He left two sons, Nicerus and Ariston, to whom he taught his art. See GREEK ART.

**ARISTIDES,** SAINT. A Greek Christian apologist, of the second century, who also taught rhetoric and philosophy. He dedicated to Antoninus Pius (138–61) an Apology for the Christian faith, which was highly esteemed by the early Church. This work was long lost, with the exception of a fragment discovered and published at Venice in 1878. Dr. J. R. Harris, however, found the complete Apology in 1889 in a Syriac version on Mount Sinai. It was inscribed to the Emperor Titus Hadrianus Antoninus Augustus Pius. For both Syrian text and translation, consult J. R. Harris, "The Apology of Aristides," in his *Text and Studies* (1891); R. Seeberg, "Die Apologie des Aristides undersucht und wiederhergestellt," in Zahn's *Forschungen zur Geschichte des neutestamentlichen Kanons,* v. 161–437 (1893).

**ARISTIDES QUIN'TILIA'NUS** (Gk. *Ἀριστείδης Κοιντιλιανός, Aristeidēs Kointilianos*). A Greek grammarian of about the third century A.D., and author of a treatise on music which is one of the most valuable of all ancient discussions of that subject. In the first part it treats of the principles of harmonics and rhythm, as laid down by Aristoxenus (q.v.), but later introduces the Neo-Platonic ideas of the moral effects of music and the connection between musical intervals and the harmony of the universe. It was originally edited by Meibomius (Amsterdam, 1652), and in 1882 by Jahn. Consult Cäsar, *Die Grundzüge der griechischen Rythmik im Anschluss an Aristeides* (Marburg, 1861), and T. D. Goodell, *Chapters on Greek Metric* (New York, 1902).

**AR'ISTIP'PUS** (Gk. *Ἀρίστιππος, Aristippos*). The founder of the Cyrenaic or Hedonistic school of philosophy. He was the son of Aristades of Cyrene, in Africa, and was born probably not long before 435 B.C. He was drawn to Athens by the fame of Socrates, whose pupil he remained until his master's condemnation and death, without, however, adopting fully his philosophy. After Socrates's death he lived in various cities, avoiding all hindering connections by becoming a citizen of no state, but having guest friends in many. We know that he sojourned some time in Ægina, in Corinth, where he was intimate with the famous courtesan Laïs, and especially at the Syracusan court. He must have spent considerable time also in his native Cyrene,

where he possessed property, for his philosophic school was there established. His master, Socrates, had taught that virtue and felicity together formed the highest aim of man; the latter Aristippus emphasized as a principle in itself, and declared that pleasure (*ἡδονή, hēdonē*) was the supreme good. To know how to select one's pleasures and to subordinate them to reason is to master the art of life. According to him, our sensations alone are the real bases of knowledge, and all that gives pleasant sensations must be good, virtue and all so-called moral obligations and limitations have no validity so far as they limit pleasure. In holding that our sensations are the only real bases of knowledge he agreed with Protagoras, who, perhaps, was one of his teachers. Yet Aristippus shows the influence of Socratic doctrine when he teaches that the wise man will wish to preserve the enjoyment he may secure by practicing self-control, judgment, and moderation, and for the same end will resist the mastery of the passions. Further, the greatest pleasure is to be found in the cultivation of the mind. For this teaching he has been not inaptly named a pseudo-Socratic.

Many anecdotes about Aristippus have come down from antiquity. They show him to have been a skillful man of the world, capable of adapting himself to the changes of fortune. Plato is reported to have said that Aristippus was the only man he knew who could wear with equal grace both fine clothes and rags. Diogenes Laertius has preserved to us many of his *bonmots* and repartees. He apparently did not formulate a philosophy himself; the Cyrenaic system was probably worked out by Arete, his daughter, and by her son, Aristippus the younger. (See HEDONISM.) Aristippus's works have been lost; the five letters to which his name is attached are unquestionably spurious. Consult Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893), and Ueberweg, *History of Philosophy*, Eng. trans. (New York, 1877).

**ARISTIPPUS** THE YOUNGER. A Greek philosopher, son of Arete, daughter of Aristippus. He was inducted by Arete into his grandfather's philosophy, and hence was known as *Μητροδίδακτος*, 'Mother-Taught.'

**ARISTO**, ȧ-rēs'tō. Sganarelle's brother in Molière's *Ecole des maris*.

**ARISTOBULUS** (Gk. *Ἀριστόβουλος, Aristoboulos*). An Alexandrian Jew who lived under Ptolemy VII, Philometor (181–145 B.C.). He was the author of a work on the Pentateuch, of which only fragments are preserved in Clement of Alexandria and in Eusebius. It was intended to show that Greek philosophers and poets had borrowed their views from the Pentatcuch; and to support this theory numerous quotations were taken from works ascribed to Linus, Hesiod, Homer, and Orpheus, of which also Christian apologists made abundant use. Many scholars have questioned the genuineness of the work of Aristobulus. Among them are such men as Richard Simon, Humphrey Hody, Eichhorn, Gratz, Renan, Kuenen, Elter, Wendland, and Bousset. Their arguments have been based on the assumed familiarity with the Letter of Aristeas, the peculiar form of the quotations from Orpheus and others, and the supposed claim of Aristobulus to be the teacher of Ptolemy. The genuineness has been defended by Valckenaer, Gfrorer, Freudenthal, Clemen, Friedländer, Schlatter, and Schürer. It has been pointed out that Demetrius of Phalerum may have made suggestions to Ptolemy II during his coregency with his father, before the plot to place Eurydice's son on the throne led to the removal of Demetrius; that Aristobulus may have adopted in good faith the Orphic poems from some older work of a Jewish writer; that his address to Philometor resembles that of many a Christian apologist and does not imply a claim to be the King's teacher; and that there is no motive for a forgery, the author never concealing his Jewish character. The question is discussed at length and a full bibliography is given by Schürer, *Geschichte des jüdischen Volkes*, iii, pp. 512 ff. (4th ed., 1909).

**ARISTOBULUS** OF CASSANDRIA. A Greek historian, born in a city of Chalcidice, but afterward—later than 316 B.C.—a citizen of Cassandria. When 84, after 285 B.C., he wrote an historical work of unknown title on Alexander the Great, whom he accompanied on his Asiatic campaigns. This work was freely used by later authors, especially Arrian, Strabo, and Plutarch

**ARISTOBULUS I.** A prince of Judæa, who succeeded his father, John Hyrcanus, as high priest in 104 B.C. His mother (or step-mother) had been given the royal office by the will of Hyrcanus, but the son deposed her and put her in prison, where she died of hunger, while he took the title of king, according to Josephus, in addition to the title of high priest which appears on his coins. Aristobulus had a decided leaning toward Hellenism, though, despite this fact, he remained Jewish in his feelings. He was disliked by the people for imprisoning his mother, and all his brothers, except Antigonus, whom he also, at a later period, is said to have murdered at the instigation of Queen Salome. Josephus declares that he conquered a large part of the Iturean country and compelled the inhabitants to accept Judaism. This would seem to imply that he also held possession of Galilee. He died in 103 B.C. of a malignant disease. Consult Wellhausen, *Israelitische und jüdische Geschichte*, pp. 274 f. (6th ed., 1907), and Schürer, *Geschichte des jüdischen Volkes*, pp. 256 ff. (3d ed., 1901). See MACCABEES.

**ARISTOBULUS II** (?–49 B.C.). A Jewish ruler and ecclesiastic, son of Alexander Jannæus (brother of Aristobulus I) and Salome Alexandra (widow of Aristobulus I), who succeeded in grasping the high-priestship and the royal authority from his elder brother, Hyrcanus II, to whom both belonged. Aristobulus maintained himself from 69 to 63 B.C., when Hyrcanus appealed to Pompey. After many intrigues and changes of front, Pompey finally took sides against Aristobulus, and, after reducing the extent of the Jewish possessions, placed Hyrcanus in charge as high priest, without the title of king. Aristobulus was taken as a prisoner of war to Rome. In 56 he escaped to Judæa and fought the Romans again. He was, however, defeated and again taken to Rome. He was released by Cæsar in 49, and sent by him with troops to Judæa, to agitate against Pompey, but in the same year he was poisoned by adherents of Pompey.

**ARISTOCRACY** (Gk. *ἀριστοκρατία, aristokratia*, from *ἄριστος, aristos*, best + *κράτος, kratos*, power). A form of government in which the sovereign power is vested in a small number of citizens, as opposed to monarchy, in which

the supreme authority rests with one man, and to democracy, where the ultimate authority is exercised by the entire body of freemen. Etymologically, the term denotes the rule of the "best," used, however, in the sense of the Greek *aristos*, which connoted high birth and the possession of wealth, as well as personal excellence. In an aristocracy, however, though the power of government was wielded by a few, theoretically the administration of government was carried on for the welfare of the many. Whenever the interests of the commonwealth were made subservient to the interests of the rulers, aristocracy degenerated into *oligarchy*. To the Greek mind aristocracy appealed as the most acceptable form of government, in that it was free alike from the dangers of despotism and mob rule. Athens, before the period of the Persian wars, and Sparta, practically during the entire course of its history, were aristocracies in fact, since in both places the chief power was exercised by senates which represented only the noblest and wealthiest families of the state. The same was true of Rome for at least 250 years before the establishment of the Empire. As preëminence in rank became less closely associated with the ownership of land, there arose aristocracies of wealth as well as of birth, typified by ancient Carthage and modern Venice. In the Middle Ages there was no aristocracy, strictly speaking, for though political power reposed in the hands of a very small portion of the people, each feudal lord in his own domain was sole master. It was only with the rise of the modern state that an aristocracy again became possible. It appeared, however, in quite a different form from the ancient aristocracy and partook rather of the nature of a privileged social class. Where the sovereign power was vested in the king, as was the theory of monarchical government in early modern times, aristocracy referred rather to a monopoly of titles and offices than of actual political power. Still, the rule of powerful families was not rare in the history of Europe, especially at times when weak kings occupied the throne, as was the case with the Guises of France and the rulers of the house of Valois. In England the government, from the accession of the house of Hanover down through the eighteenth century, though parliamentary in form, was in fact an aristocracy, since king and Parliament alike were under the control of a few great Whig families. At present, however, though the aristocratic element is still strong in Great Britain and Germany so far as the enjoyment of public office is concerned, the term "aristocracy" has become almost entirely social in meaning, and is used loosely and in a great variety of combinations to denote a select few —as aristocracy of birth, of wealth, or of brains. See GOVERNMENT.

**AR/ISTOGI/TON.** See HARMODIUS AND ARISTOGITON.

**AR/ISTOL.** A light-brown, amorphous powder formed by the union of iodine and thymol. It contains 45.8 per cent of iodine. Chemically it is dithymol-diiodide. Insoluble in water and glycerin, it is freely soluble in ether and fatty oils, and slightly so in alcohol. Its action is similar to that of iodoform (q.v.), but it possesses the advantage of being odorless. Being an unstable compound, it cannot be mixed with substances which have a tendency to combine with iodine and so is best used alone. It is used as a substitute for iodoform, as a mild antiseptic, dusting powder or ointment in dressing wounds, and in various skin diseases.

**ARISTOLOCHIA,** ă-rĭs'tō-lō-kĭ'a (Lat. from Gk. ἀριστολόχεια, *aristolocheia*, an herb promoting childbirth, like birth-wort, from ἄριστος, *aristos*, best + λοχεία, *locheia*, childbirth, childbed). A genus of plants of the family Aristolochiaceæ. This family consists of herbaceous plants or shrubs, often climbing shrubs, and includes more than 200 known species, chiefly natives of warm climates, and particularly abundant in the tropical regions of South America. Our wild gingers (*Asarum*) are herbs, but most of the representatives of the family are shrubby, some of them climbing to the summits of the loftiest trees. Several are found in the south of Europe; one only, the common birthwort (*Aristolochia clematitis*), occurs upon the Continent as far north as about lat. 50°, and is a doubtful native of England. It is a perennial plant, with erect, naked, striated stem, heart-shaped dark-green leaves on long stalks, the flowers stalked, and growing to the number of sometimes seven together, the tube of the perianth about one inch long, and of a greenish color. It grows chiefly in vineyards, hedges, about the borders of fields, among rubbish, and in waste places. It has a long branching root, with an unpleasant taste and smell, which, with the roots of *Aristolochia rotunda* and *Aristolochia longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the English name. These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *Aristolochia indica* is used in the same way by the Hindus. *Aristolochia serpentaria*, Virginia snakeroot, is a native of most parts of the United States, growing in woods. It has a flexuous stem, 8 to 15 inches high, bearing heart-shaped, very acute leaves. The flowers are on stalks, which rise from near the root; the orifice of the perianth is triangular. The root has a penetrating, resinous smell and a pungent, bitter taste. It has long been a fancied remedy for the bite of a rattlesnake. It possesses stimulant, tonic, and diaphoretic properties. It forms an article of export from the United States to Europe, being highly esteemed as a medicine in certain kinds of fever. Its reputation as a cure for serpent bites is shared by other species, natives of the warmer parts of America. Several South American species seem also to possess medicinal properties analogous to those of the Virginia snakeroot. *Aristolochia sipho* or *Aristolochia macrophylla*, a climbing shrub of 15 to 20 feet in height, a native of the southern parts of the Alleghany Mountains, is frequently planted in the United States, in Great Britain, and on the Continent of Europe, to form shady bowers. It has very large round or somewhat heart-shaped leaves (a foot in breadth), of a beautiful green. The flowers hang singly, or in pairs, on long stalks; the tube of the perianth is crooked in its upper part, inflated at the base, and lined with reddish-brown veins, having a sort of resemblance to the bowl of a tobacco pipe, for which reason the shrub is sometimes called pipe-shrub, pipe-vine, or Dutchman's pipe. *Aristolochia tomentosa* resembles *Aristolochia sipho*, except in being smaller, very hairy, and in having yellow flowers. The tropical species are distinguished for their beauty and the peculiar

forms of their flowers. Some of them are much-prized ornaments of our hothouses, *Aristolochia grandiflora* (*Aristolochia gigas* of Lindley), the goose flower or pelican flower of the West Indies, being one of the most important. Its name is derived from the fancied resemblance to the bird.

**ARISTOMENES**, ăr'ĭs-tŏm'ē-nēz (Gk. *Ἀριστομένης*). A Messenian general who commanded the army of his country against Sparta in the Second Messenian War, in the seventh century B.C. He upheld with success the Messenian cause for about 17 years, but was finally defeated and went, according to one story, to Rhodes, where his son-in-law was one of the reigning princes. Many heroic deeds are related of Aristomenes.

**ARIS'TON.** A Greek painter. See ARISTIDES OF THEBES.

**ARISTON** (Gk. *Ἀρίστων*), or **ARIS'TO OF CHIOS** (?–c.250 B.C.). A disciple of Zeno and afterward, according to Diogenes Laertius, of the Platonist Polemo. He taught philosophy at Athens with great influence and distinction. Though a professed Stoic, he differed from Zeno in that he rejected all branches of philosophy except ethics and held that the moral improvement of men was the sole purpose of philosophy. He maintained that the supreme good consisted in *ἀδιαφορία, adiaphoria*, or entire indifference to everything except virtue and vice, and recognized only one virtue, which he called *ὑγίεια, hygieia*, or health of soul, and doubted the existence of God. Ariston was called Siren, from his eloquence, and Phalanthus, from his baldness. See Zeller, *The Stoics, Epicureans, and Sceptics* (Eng. trans., London, 1892).

**ARISTOPHANES**, ăr'ĭs-tŏf'*a*-nēz (Gk. *Ἀριστοφάνης*) (c.445–c.385 B.C.). The only writer of the old Greek comedy of whose plays any survives entire. He was the son of one Philippus and was born possibly in the deme of Cydathene. Tradition says he also had property in the island of Ægina, and was therefore sometimes called an Æginetan. That his education was of the best is shown by his intimate knowledge of Æschylus, Stesichorus, and Pindar. His genius was of the highest order, so that he maintained himself for over a generation as more than peer among the brilliant writers of comedy of his day. In politics he favored, with all the force of his impetuous nature, the aristocratic peace party; and in his hands, comedy, which had been given a political turn by his older contemporary, Cratinus, became in the first period of the Peloponnesian War a most effective weapon against the demagogues and their faction. In all his plays Aristophanes is a conservative, opposing all things that are new. His sharp wit and biting humor on at least two occasions stirred Cleon to bring suits against him.

Aristophanes' literary activity covered 40 years (427–388 B.C.), and his plays mirror the political and the social changes of the state. We can distinguish three periods: the first ends with 421, the second with 405, and the third with 388. In all we have 44 titles of plays ascribed to Aristophanes, of which four are considered spurious; from the 40 genuine plays 11 are preserved, of which five belong to the first period. Aristophanes' earliest play was *The Banqueters*, produced in 427, a satire on the new-fangled teachings of the Sophists as compared with the simple education of the fathers. *The Babylonians* (426) contained a sharp attack on the demagogue Cleon. Both these plays are lost. *The Acharnians* (425) won the first prize. It is a satire on the headstrong jingoes at Athens who are typified in the play by Lamachus, an Athenian general, one of the war party. The blessings of peace are exhibited by the good fortune of an old countryman, Dicæopolis, 'Righteous City' or 'Honest Policy,' who makes a private treaty with the Lacedæmonians for 30 years and thereby enjoys all blessings, in contrast with Lamachus, who comes to grief with his campaigning. *The Knights* (424) also won the first prize. This is the first play which Aristophanes brought out in his own name; of the three previous plays, *The Babylonians* and *The Acharnians* were produced under the name of Callistratus, *The Banqueters* under that of an actor, Philonides. In *The Knights* Aristophanes fulfills the promise which he made, in *The Acharnians* the year before, to cut Cleon into pieces. The demagogue is here represented as a vulgar, insolent charlatan; the people are represented in the person of a credulous and fickle old Demos, and the poet is thus able to show the weaknesses of the credulous and fickle mob that governed Athens. At the end Cleon is discomfited and old Demos has his youth renewed so that he clearly sees how he has been tricked. It is said that Aristophanes himself was obliged to take the part of Cleon, as no actor was willing to incur the enmity of the influential demagogue. *The Clouds* (423) was not so successful as the two previous plays. Its present form is a revision of the original. This comedy is a satire on the pretensions of the new Sophistical school and an attempt to point out its dangerous tendencies. Hence in this play Aristophanes returned to the theme he had handled in his first play, *The Banqueters*. Socrates is taken as the representative of the Sophistical school, whether because Aristophanes did not understand his teachings, or because he was a convenient butt, is uncertain. It represents a young Athenian, Phidippides, who is ruining his father by his spendthrift habits. So the old man sends him to the "thinking-shop" of Socrates, where he can learn to make the worse appear the better cause and so save his father by enabling him to escape the payment of his debts. The son, after some hesitation, reluctantly enters the school and learns his lesson all too well. A famous scene of *The Clouds* represents a dialogue between the Just and the Unjust Argument, in which the latter wins and obtains the mastery over the pupil. The youth returns to his home thoroughly trained in the new sophistic and, at a festival made by his father for his return, sings an immoral passage from Euripides, thrashes his father, and then justifies what he has done by the art he has just learned. His old father's eyes are now opened, and he takes vengeance on Socrates by setting his "thinking-shop" on fire. It is said that the reckless young Phidippides was intended to represent Alcibiades. *The Wasps* (q.v.) (422) is a ridicule of the regular courts of justice. *The Peace* (421) is a play in the interests of the truce between the Athenians and the Spartans consummated in this year. Peace is brought down from heaven and restored to earth. This play renews the discussion begun in *The Archarnians*.

Seven years passed before Aristophanes produced another play. In the meantime public measures had been taken to check political

satire, and *The Birds* (414) ridicules the Athenians' fondness for litigation and their flighty character. Two old men leave Athens in disgust and with the aid of the birds establish the city Cloud-cuckoo-town, in mid-air, shut off the gods from enjoying sacrifice, and win back the sceptre from Zeus. The whole play is very brilliant and clever; it contains some exceptionally beautiful lyrical passages. Some have wished to see in it a caricature of the Athenians' hopes of founding a great western empire in Sicily, and a satire on Alcibiades, an ardent imperialist. The *Lysistrata* (411) represents a woman's conspiracy to bring about peace; the play thus belongs with *The Acharnians* and *The Peace*. War between Athens and Sparta had been renewed three years after the Peace of Nicias. Lysistrata, 'Disbander of Armies,' persuades the matrons of Athens to desert their husbands and to refuse to return home till peace is again established. The *Thesmophoriazusæ*, produced three months after the preceding comedy, contains an attack on Euripides, whom the women, who are celebrating the Thesmophoria (see GREEK FESTIVALS), propose to punish for his hatred of them. *The Frogs* (405) is devoted to literary criticism. In the opening scenes Dionysus is on his way to Hades in search of a good poet, for Sophocles and Euripides have just died. The remainder of the play is given to the adventures of Dionysus in Hades, and the contest between Æschylus and Euripides for the seat of honor there, which Æschylus wins. The real subject is the decay of tragic art, for which Euripides is blamed. The *Ecclesiazusæ* (392 or 389 B.C.), or *The Women in Parliament*, is a satire on communistic ideas current at this time. The women disguised as men occupy the Pnyx (see ATHENS), and adopt a new thoroughgoing communistic constitution, in which the government of Athens is handed over to the women. In the *Plutus* (which failed in 408, but was revived in 388) the god of wealth has his sight restored to him, and thereafter confers his blessings only on the deserving. The play "is an allegory, a picture of society turned upside down by the redistribution of wealth."

It will be seen that in the extant plays there is a gradual change from political and personal satire to caricature of social conditions; furthermore, the local character of the earlier plays gives way in the later to a certain cosmopolitanism. These, therefore, form the transition to the middle and new comedy. Aristophanes, in the opinion of the ancients, held a middle place between his older contemporaries, Cratinus and Eupolis, combining the severe character of the one with the grace of the other. In wit, rollicking humor, invention, skill in the use of language and rhythm, he has never been surpassed. The text is best edited by Meineke (Leipzig, 1860), Blaydes (Halle, 1886), and Hall and Geldart (Oxford). The Scholia were published by G. Dindorf (Oxford, 1835), and by Dübner (Paris, 1842); those from the Ravenna MS. were edited by Rutherford (London, 1896). There are numerous commentated editions of single plays; J. Van Leeuwen has published an annotated edition of all the plays (Leyden, 1893–1905). English translations have been made by Mitchell, Frere, Rogers, Kennedy, Tyrrell, Murray, and Starkie. Consult J. Van Leeuwen, *Prolegomena ad Aristophanem* (Leyden, 1908), for a discussion of the life and writings of Aristophanes; M. Croiset, *Aristophanes and the Political Parties at Athens*, trans. by James Loeb (London, 1909); W. Süss, *Aristophanes und die Nachwelt* (Leipzig, 1911).

**ARISTOPHANES** OF BYZANTIUM (c.260–180 B.C.). A learned Greek grammarian, one of the foremost scholars of the ancient world. He was a pupil of Zenodotus at Alexandria, where he was subsequently instructor of the famous critic Aristarchus of Samothrace and director of the great library. He was the first to attempt a critical edition of the Homeric poems and made extensive study of Hesiod, Plato, Aristotle, Alcæus, Anacreon, Pindar, and the comic and the tragic poets. In his edition of Homer he differed much from Zenodotus, and showed scientific spirit by faithfully recording manuscript evidence, even where he rejected it. He introduced into the Greek language the use of accents, reduced punctuation to a system, and invented several new symbols for use in textual criticism. He wrote also an important lexicographical work, which showed a wide knowledge of dialects. Consult Sandys, *A History of Classical Scholarship*, i, 126–131 (Cambridge, 1906).

**ARISTOPHANES' APOL'OGY.** The sequel to Browning's *Balaustion's Adventure*, published in 1875. It is a long poem in blank verse, supposed to commemorate the defense made by Aristophanes for his comic art, on learning from the venerable Sophocles of the death of the tragedian Euripides.

**AR'ISTOTE'LIA.** See MAQUI.

**AR'ISTOTLE** (Gk. *Ἀριστοτέλης, Aristotelēs*) (384–322 B.C.). A Greek philosopher, born at Stagira, a Greek town of the Chalcidice, on the Strymonic Gulf, the present Stavro. He came of a family in which the practice of medicine was hereditary, and his father, Nicomachus, was physician-in-ordinary to the Macedonian King, Amyntas II. From his father Aristotle undoubtedly inherited his love for natural science and through him came into relation with the royal house of Macedonia. Nicomachus died while Aristotle was still young; the son was brought up in Stagira by a family friend, Proxenus, of Atarneus in Mysia, whose memory he held so dear that in after life he erected a statue to him at Delphi and after his death educated and adopted his son Nicanor. Aristotle doubtless received the usual education enjoyed by the son of a well-to-do family and probably was trained also for his ancestral profession. When 17 years old, he went to Athens and associated himself with the Academy. But its head, Plato, was then absent on his second journey to Syracuse, where he acted as adviser to two despots in succession, Dionysius the elder and Dionysius the younger. Aristotle for a time devoted himself to rhetoric, under Isocrates, but, on Plato's return from Sicily, he forsook rhetoric and devoted himself to philosophy. For nearly 20 years he enjoyed the teaching of Plato and association with him; in spite of the different natures of master and pupil, the relation between the two was close. Plato is said to have called him the leader and the intellect of his school, and, because of his zeal, to have likened him to a colt that needs the bit more than the spur. During this period of discipleship Aristotle seems to have begun to lecture to small circles of listeners, chiefly on the subject of rhetoric; at the same time he trained himself to a high degree of perfection in the practice of

oratory. His superior genius was so well recognized by his contemporaries that his elders, like Heraclides Ponticus, who was Plato's representative in 361 B.C., were ready to yield to him, and younger men like Theophrastus were glad to be his followers. At Plato's death in 348–347 B.C., Speusippus became head of the Academy, and Aristotle had no longer any bonds to bind him to the school. He was now in his thirty-eighth year, had enjoyed long intimacy with the best thinkers in Greece, and had undoubtedly already developed to a considerable degree an independent philosophical position. With Xenocrates of Chalcedon, who likewise withdrew from his old associates, Aristotle went to Mysia, and presently accepted an invitation from a former fellow-pupil in the Academy, Hermeas, headman of Atarneus, to take up his residence with him. Here he remained three years, until Hermeas was, through treachery, captured by the Persians, and put to death by Artaxerxes III. Aristotle sought refuge in Mytilene, taking with him the niece and sister of Hermeas; he afterward married the latter, who died somewhat more than ten years later in Macedonia. On the basis of certain allusions in the opening of Isocrates' *Panathenaicus* it has been conjectured that the following two years Aristotle spent again in Athens, teaching in company with others in the Lyceum; this conjecture, however, has a very uncertain basis.

During the many years spent at Athens and in Asia Minor Aristotle's hereditary relation with the Macedonian court seems to have been unbroken; for in 343–342 B.C., in response to a call from Philip to educate his son Alexander, then 14 years old, he removed with his family and Theophrastus to Pella, the Macedonian capital. He acted as tutor to Alexander for three years. The plan of the education attempted by him is unknown to us: but it is most probable that the philosopher added to the ordinary education of the day in rhetoric and philosophy some instruction in at least history, geography, and politics suited to a future ruler. How far his pupil absorbed teaching is also uncertain, although we know that his later plans for conquest were in opposition to Aristotle's views. Yet Aristotle was held in high esteem by both Philip and Alexander; during his residence at court he was able to obtain the restoration, at the public expense, of his native city, which had suffered severely in 348 B.C. when Philip conquered the district about the Strymon; later he was able to secure from Alexander protection for Eresus, in Lesbos, the home of his friend Theophrastus. The greatest favors he received, however, were in the way of support and material for his scientific investigations; and his years of residence at the Macedonian court, where he could observe at close range the rule of an aggressive monarch, must have been of the greatest importance in developing his political ideas.

After Alexander mounted the throne and undertook his Eastern conquests, Aristotle returned to Athens in his fiftieth year, to carry out a plan, no doubt long cherished, of opening a school of his own. This he established in the Lyceum, in a building called "The Walk" (*περίπατος*), where he lectured. We have a tradition, doubted by some, that he gave two kinds of instruction: in the morning to a narrow circle of advanced pupils (his esoteric doctrine), and, in the evening, more popular lectures (exoteric teaching) to a larger body of listeners. The name "Peripatetic," applied to the school and its philosophy, cannot be traced back of 200 B.C. Of the equipment of the school, in books and material, we know nothing. Aristotle continued to teach for 12 years, until Alexander's death, in 323 B.C., which led to a reaction at Athens against Macedonia, made his position in Athens dangerous. He was charged with impiety, but fled to Chalcis, as he said, to save the Athenians from a second sin against philosophy. Here he died. Theophrastus and Eudemus were his immediate successors in the leadership of the school.

Aristotle left behind him an enormous number of writings. Diogenes Laërtius, of uncertain date, gives us a list of 46 works. This probably represents the works bearing Aristotle's name in the Alexandrian Library. A list dating from the time of Cicero makes the total much larger. An ancient tradition, given by Strabo (xiii, 1), says that Theophrastus, at his death, bequeathed his library, including of course the works of Aristotle, to a certain Neleus of Scepsis. His descendants buried the books to save them from the rapacity of the Attalids, who were eager to enrich the Pergamene Library by every possible means. About 100 B.C. the buried collection, naturally much injured by damp and worms, was discovered by Apellicon of Teos, a learned bibliophile, who brought it to Athens. When Sulla captured the city, 86 B.C., he took the books to Rome, where their value was recognized by the grammarian Tyrannion, who had a catalogue prepared by the Peripatetic Andronicus—the longer list mentioned above—and about 50 B.C. published the works thus recovered. Our present recension undoubtedly goes back to this edition, although it is more immediately related to a recension prepared toward the end of antiquity which embraced a number of spurious writings. The later Peripatetics divided the complete works of their master into two classes; exoteric dialogues intended for the public, and acroamatic pieces meant for the small circle of pupils. To these may be added as a third class certain writings not intended for publication, the hypomnematic works consisting of memoranda and collections on various topics. The exoteric dialogues were well known and much admired in antiquity, but only bare fragments have come down to us. These dialogues did not possess the dramatic character of Plato's works; in place of question and answer they had long discourses, such as we find in the philosophical writings of Cicero, who chose Aristotle as his model. Among the titles of the exoteric dialogues known to us are *On the Immortality of the Soul*, *On Philosophy*, *On the Good*, *On Justice*, *On Friendship*. Certain titles, e.g., *Menexenus*, *Gryllus*, *Nerinthus*, *The Sophist*, remind us of Plato's dialogues. Aristotle carefully prepared these for publication and must have exhibited in them that perfection of style which caused Cicero to speak of the philosopher's language as a golden stream. The extant works show but little of this quality. These were never completely prepared and in many cases probably were never intended for publication by Aristotle, but were edited by Theophrastus, Eudemus, and the philosopher's son, Nicomachus. Many have the character of lecture notes, possibly those taken by pupils, and most have suffered from interpolations. A considerable number of the works to which his name is now attached are

spurious. The extant writings may be classed, according to their contents, under Logic, Metaphysics, Natural Science, Ethics and Politics, Rhetoric and Poetics.

The works on Logic were called by the later Peripatetics the *Organon*, 'The Instrument,' as they deal with the instrument and the method of investigation and discussion. They include the *Categories*, on the ten classes of predicates—substance, quantity, quality, etc.; *On Interpretation*, dealing with the proposition and its parts; *Analytica Priora*, in two books, on the syllogism; *Analytica Posteriora*, in two books, on the theory of knowledge and the scientific method; *Topica*, in eight books, on dialectics and reasoning from probabilities; and *Sophisms*, on the fallacies of the Sophists and their correction. Aristotle's claim that he was the first to work out a method of reasoning is sound, and formal logic has made little advance since his day; it has only added to his categorical syllogism (discussed in the *Analytica Priora*) the hypothetical and disjunctive forms, and has supplemented his three figures by a fourth.

The *Metaphysics*, in 13 books, was so called by later students, because in the ancient editions of Aristotle it followed the works on physics. The philosopher himself called it "First Philosophy" (*πρώτη φιλοσοφία*). It is in an unsatisfactory condition, consisting of one finished treatise and a number of shorter sketches hardly connected or fully worked out. It begins with a criticism of previous philosophical systems—the earliest history of philosophy—and then, after stating the philosophical questions preliminary to the examination, discusses the doctrine and the ultimate grounds of Being.

The works on Natural Science comprise the *Physics*, in eight books, treating of the general principles and relations of nature; four books *On the Heavens*, and two *On Beginning and Perishing*. The last treatise is important for a knowledge of Aristotelian philosophy. The *Meteorology* discusses the phenomena of the heavens. Natural History is handled in 10 books; with it are associated the following treatises: *Parts of Animals*, in four books; *Generation*, in five, and *Mode of Progression*, in one. To these must be added certain works of doubtful authenticity: *On Plants*, in two books, a retranslation from the Latin and probably the work of Nicolaus of Damascus, who composed, under Augustus, a compendium of Aristotle's philosophy; *On the Cosmos*, certainly belonging to the Roman period; *On the Motion of Animals*, *On Breathing*, *On Colors of Plants and Animals*, all later than Aristotle. The treatise on *Physiognomy*, which was composed certainly as late as Hadrian's time, is based apparently on two lost works named in the ancient catalogues of the Aristotelian writings. The *Problems*, discussions chiefly of physical questions, is also drawn in part from the philosopher's work. The *Mechanics*, *Mirabiles Auscultationes*, and some other minor monographs falling within the same field are certainly spurious.

According to Aristotle's own view, psychology was inseparably connected with natural science. Under this head we possess his work *On the Soul*, in three books, and a large number of smaller treatises which are known as the *Parva Naturalia*.

Next must be named the works on Ethics and Politics, which Aristotle regarded as parts of the same subject. Under the former division there are extant three works: The *Nicomachean Ethics*, in 10 books, which takes its name from the philosopher's son, Nicomachus, to whom the work is dedicated and by whom it probably was edited. This is Aristotle's work. The *Eudemean Ethics*, in seven books, was prepared by Aristotle's pupil Eudemus on the basis of his master's lectures and the *Nicomachean Ethics*, with which it coincides in parts (in books iv–vi). The *Magna Moralia*, in two books, is a late work of the Peripatetic school, and nothing more than an abstract of the other works. In the *Nicomachean Ethics* Aristotle held that every action, every art and science, has some good as its aim; the chief aim of human action is happiness. The happy man is he whose activity is in harmony with virtue and who is adequately provided with external goods through all his life. Virtue is in all cases a mean between extremes. An essay *On Virtues and Vices* is also spurious. The *Politics*, in eight books, is closely connected with the *Ethics*. The work is incomplete but masterly, discussing the elements and the aims of the state, the forms of government, and the ideal state. The loss of the *Constitutions*, which treated of 158 states, is greatly to be regretted; but fortunately the greater part of the *Constitution of Athens*, which belonged to the larger work, was recovered, almost in its entirety, in 1885 from four papyrus rolls of the first century A.D., first published by Kenyon in 1891. This document is one of the most valuable for the history of Athens, and has at many points corrected and enlarged our previous knowledge. Aristotle's ideal was the small, autonomous, aristocratic city-state. The *Economics*, in three books, is the work of the later school.

In the field of Rhetoric and Poetics, Aristotle also made contributions of the highest value and permanence. His *Rhetoric*, in three books, treats of the relations of rhetoric to dialectic, the nature of the proof the orator may employ, the use of examples, and language and style. In this work also appear beginnings of formal grammar and its technical terms. The *Rhetoric* addressed to Alexander, which is catalogued with Aristotle's works, was written by Anaximenes. Of the *Poetics*, only the first book on tragedy and epic poetry is preserved, but this is of inestimable value for its analyses of the various kinds of poetry and its full treatment of tragedy.

From this enumeration of the most important extant writings of Aristotle, the universality of his studies is evident; and in every field enumerated his influence has been enormous. By him Logic, Grammar, Rhetoric, Literary Criticism, Politics, Psychology, Ethics, Natural History, Physiology, were raised to independent disciplines; he was the first to attempt a history of Philosophy and Government. This many-sided literary activity was the natural result of his method of working, proceeding from the individual to the general; and this method, which collects facts, compares, sifts, and groups them according to their relations, and thus obtains systematic knowledge of the subject in hand, has been most fruitful in the history of investigation of every sort, especially in the nineteenth century.

Aristotle's service lies in his analysis and clear distinction of ideas and in his studies in particular fields, rather than in the full development of a philosophy. Yet here he made important advances that have been influential down to the present day. According to him,

Being has four universal elements: Matter, form or essence, the efficient cause, and the final cause. These principles enter into the constitution of everything. Matter is mere potentiality, which through the supervention of Form becomes the Actual. By Form, Aristotle wished to replace the Platonic idea, which, he pointed out, cannot exist apart from the individual. Every change from potentiality to actuality is accomplished by an efficient cause which is working toward an end, the Final Cause. In the field of Ethics this final cause is man's *summum bonum*, happiness, which is defined to be the activity of the soul in accordance with virtue, but under favorable conditions. The problem of free-will Aristotle met by the statement that man has a potentiality in two opposite directions—for good or evil—which can be freely chosen; by consistently choosing one a man forms the habit of virtue or vice, and thus becomes either virtuous or vicious, as his choice determines. Virtue itself lies between the extremes of self-indulgence and asceticism.

The influence of Aristotle on human thought has continued unbroken to the present day. In the early centuries of our era his writings stimulated scientific inquiry; during the Middle Ages Latin translations from the Arabic versions guided the philosophy of the Western church, although the real nature of Aristotelianism was little understood. Arabian philosophy in the West during the eleventh and twelfth centuries was a combination of Aristotelianism with certain Neo-Platonic elements. With the revival of learning the originals of Aristotle's works became gradually known, and from them were drawn the means to combat the errors of scholasticism.

Learned comment on Aristotle began with the first century B.C., and during antiquity and the early mediæval period the amount of comment grew to be enormous. The standard edition of the works is still that by Bekker (5 vols., 1831–40). Vols. i and ii contain the Greek text; iii, the Latin translations; iv, scholia, edited by Brandis; v, the fragments, edited by Rose, and Bonitz's index. A new and complete edition of the ancient commentaries is being published by the Prussian Academy. Twenty-five volumes have already appeared. Of editions of single works, the following are valuable: Trendelenburg's *Psychology* (1877); Schwegler-Bonitz's *Metaphysics* (1848); Ramsauer's *Nicomachean Ethics* (1878); Stewart's *Notes on the Nicomachean Ethics* (Oxford, 1892); Susemihl's *Politics* (1879); Spengel's *Rhetoric* (1867); Vahlen's *Poetics* (1884); Butcher's *Poetics* (3d ed., London, 1902); Bywater's *Poetics* (Oxford, 1909); Cope and Sandys's *Rhetoric* (Cambridge, 1877); Sandys's *Constitution of Athens* (London, 1893); Wilamowitz's *Constitution of Athens* (Berlin, 1891). Useful English works of general import are Grote's *Aristotle* (1872); Grant's *Ethics of Aristotle* (London and Edinburgh, 1877); Bywater, *Ethics* (1890); Jowett, *Politics* (1885); Newman, *Politics* (1887); Wallace, *Psychology* (1884); Hammond, *Psychology* (1902); Zeller's *Aristotle and the Earlier Peripatetics* (London, 1897); Wallace, *Outlines of the Philosophy of Aristotle* (Oxford, 1883); Navarre, *Essai sur la rhétorique grecque avant Aristote* (Paris, 1900). General bibliography by Schwab (Paris, 1896). For influence of Aristotle upon Arabic philosophy, see ARABIC LANGUAGE; AVERROËS.

**AR'ISTOX'ENUS** (Gk. *'Αριστόξενος, Aristoxenos*) (fourth century B.C.). The greatest student in Greek antiquity of the science of rhythm and music. He was a son of Spintharus and a native of Tarentum. He received his first instruction from his father, who had himself been a pupil of Socrates and was well versed in musical matters. He later studied music under Lamprus of Erythræ, and music and philosophy under the Pythagorean, Xenophilus of Chalcidice. He finally went to Athens and became the pupil of Aristotle. It is said that he expected, upon the death of Aristotle, to be appointed his successor, and was deeply chagrined when Theophrastus was made head of the school instead. He remained at Athens, however, and is said in the course of his life to have written 453 treatises on various subjects—musical, philosophical, and moral. His method was that of Aristotle: he based his conclusions on close observation of facts. One of his tenets was that the notes of the scale were to be judged entirely by the ear, and not, as the Pythagoreans held, by mathematical properties. He carried his musical theories into his inquiries into the nature of the soul, for he held that the soul was a sort of tuning of the body, and that from the nature and configuration of the body as a whole varied movements, i.e., life, resulted, much as harmony results in music. Only one of his works is extant—and this incomplete—*Elements of Harmony* (*'Αρμονικὰ Στοιχεῖα, Harmonika Stoicheia*) (Eng. trans. by Macran, Oxford, 1902). The best edition is by Marquard (Berlin, 1868). Consult: Westphal, *Melik und Rhythmik* (Leipzig, 1883, 1893); Laloy, *Aristoxène de Tarente et la musique l'antiquité* (Paris, 1904); T. D. Goodell, *Chapters on Greek Metric* (New York, 1902); Williams, *The Aristoxenian Theory of Musical Rhythm* (Cambridge, 1911).

**ARISUGAWA**, ä'rē-sōō-gä'wä. The name of a noble family in Japan whose members, besides showing marked ability, have been prominent in the rejuvenation of that ancient Empire. The house was founded by the seventh son of the Mikado Go-Yozei, who reigned from 1587 to 1611 and died in 1638. When in January, 1868, the Shogunate was abolished and the Emperor Mutsuhito was restored to undivided power, ARISUGAWA TARUHITO (1835–95), uncle of the Mikado by adoption and heir presumptive to the throne, became administrator and commander-in-chief of the army. He led the imperial troops against the rebels, saved Yeddo from destruction, and then directed the military operations in the north which brought the civil war to a happy conclusion (1869). In 1875 he was made President of the Senate, and in 1877 received supreme command of the forces, which suppressed the Satsuma rebellion led by Saigo Takamori, for which Arisugawa was decorated with the Order of the Chrysanthemum and made field marshal and junior Prime Minister. He devoted himself to the development of the military and naval forces of the Empire and was chief of the army staff in the war with China, in the course of which he died.—ARISUGAWA TAKEHITO (1862—), brother of the above, was adopted by him as his heir and was heir presumptive to the throne till the birth of a son to the Emperor in 1879. From that year to 1882 he was in the British navy. He commanded a cruiser in the war with China and became subsequently admiral superintendent of the naval base at Yokosuka. Before the outbreak of the

Russo-Japanese War he was made guardian of the person of the Crown Prince. As representative of the Emperor he was present at the marriage of the German Crown Prince at Berlin in 1905 and was subsequently received with marked honors in England, where he was entertained as a guest of Edward VII.

**ARITA**, ä'rē-tà. A town of Japan situated in the western part of Kiushiu, about 58 miles north of Nagasaki, with which it is connected by rail (Map: Japan, A 7). Kaolin is found in large quantities near Arita, and it is famous chiefly for its pottery works, established at the end of the sixteenth century. The porcelain of Arita used to be exported in large quantities to the Netherlands and is very highly valued. Pop., about 6000.

**ARITH'METIC** (Gk. *ἀριθμητική*, sc. *τέχνη*, *arithmētikē technē*, the art of reckoning, from *ἀριθμός*, *arithmos*, number). This primitive mathematical science involves three phases: the conception of number, the representation of numbers by symbols, and the principles and methods of computation. To these may be added the rules of ordinary business accounting, which have come to be considered part of the elements of the subject.

**The Conception of Number.** Kant advanced the idea that the number concept is derived from sequence in time, and accordingly Sir William Hamilton speaks of "the science of pure time." In recent years the Kantian idea has led to a revival, in teaching arithmetic, of the older methods, based on the cultivation of a sense for rhythmic repetition, i.e., on counting —number being regarded as a product of reflection, of an activity of the mind. On the contrary, the Pestalozzian method, which was generally employed until some years ago, followed the idea that perception alone forms the basis of all number work, and that the origin of the number concept is to be sought not in time, but in space. This principle has often been overworked. Some teachers have presented a variety of objects so systematically that the pupil learned to think of nine horses, nine feet, nine dollars, and was unable to think of the number nine without the aid of a group of objects. The reaction against the Pestalozzian plan has led teachers to lay greater emphasis on phenomena taking place successively in time; thus, to distinguish nine from six, the pupil is made to hear the clock strike the hours.

**Representation of Numbers by Symbols.** Aside from primitive number-pictures, such as the Egyptian hieroglyphics and the Babylonian cuneiform symbols, the ancients commonly used the letters of their alphabets to represent numbers—e.g., the $\alpha$, $\beta$, $\gamma$, $\delta$ of the Greeks. Somewhat more refined is the system of the Romans, who used only a limited set of letters, combining these according to simple additive and subtractive principles. But even in the Roman notation no extended calculations were possible without the aid of some registering instrument; hence the early and extensive use of the abacus. (See CALCULATING MACHINES.) The notation in use at present, which consists in combining 10 digits according to a simple position-system, originated with the Hindus, was transmitted to the Arabs, and came to the knowledge of Europeans chiefly through the labors of Leonardo of Pisa, about 1200 A.D. This powerful system freed arithmetic from the reign of the abacus.

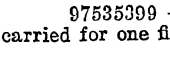
As to fractional numbers, the Ahmes papyrus, which is at least 36 centuries old, shows that the Egyptians had a knowledge of fractions at a very remote date. But while the concept and symbolism of the common fraction are thus very old, the decimal fraction, the decimal point, and other improvements in notation are comparatively recent, dating from the sixteenth and seventeenth centuries.

Besides the decimal scale, fractions have also been written on various other scales, such as the binary (scale of two), ternary (scale of three), . . . duodenary (scale of 12), and notably the sexagesimal (scale of 60) by the Egyptians and Babylonians. At present, the scale of 10 is generally recognized as the most convenient. The scale of 12, however, has the advantage of producing simpler fractional forms; e.g., on the scale of 10 the fractions ⅓, ¼, ⅛, are written, respectively, 0.333. . , 0.25, 0 125; on the scale of 12 they are written, 0.4, 0.3, 0 16.

**Arithmetic Computation.** The methods of carrying out the basal operations of arithmetic have been considerably improved since the fifteenth century. The old "galley" method of division was replaced by the "Italian" method, the superiority of which may be seen from the following examples:

*Galley.*

97535399 ÷ 9876, carried for one figure only:



*Italian.*

32.92 ÷ 3.1416

3.1416) 32.9200 (10.48
31416
150400
125664
247360

Logarithms, the greatest arithmetical achievement of the seventeenth century, were introduced by Napier (q.v.) in 1614. Many changes for the better have also been made in the operations for finding the square root and in the algorisms of applied arithmetic.

As to improvements that may be expected to be introduced in the future, the "Italian" method of division seems destined to yield to the so-called "Austrian" algorism, which is represented by the following example:

*Austrian.*

32.92 ÷ 3.1416

10.48
31416) 329200
3142
150
126
24
24

Further, proportion, or the old "rule of three," will probably be replaced by the equation as such, and the same may be expected for unitary analysis.

Regarding the teaching of arithmetic, the student of pedagogy will look for information to the writers of the nineteenth century. The following may be recommended as valuable works on the history and pedagogy of the subject: Unger, *Die Methodik der praktischen Arithmetik*

*in historischer Entwickelung* (Leipzig, 1888), Kehr, *Geschichte der Methodik*, vol. iii (Gotha, 1888); W. Rein, A. Pickel, and E. Scheller, *Theorie und Praxis des Volksschulunterrichts nach Herbartischen Grundsatzen* (Leipzig, 1893); J. A. McLellan and J. Dewey, *Psychology of Number* (New York, 1895); D. E. Smith, *Teaching of Elementary Mathematics* (New York, 1900). Notable among higher arithmetics are: Tannery, *Leçons d'arithmétique théorique et pratique* (Paris, 1894), and W. W. Beman and D. E. Smith's *Higher Arithmetic* (Boston, 1897).

**ARITHMET'ICAL PROGRES'SION.** See SERIES.

**AR'ITHMET'IC AND GE'OMET'RIC SIGNS.** Arbitrary symbols used to indicate: (1) the nature of a magnitude, as $+ a$, a positive quantity, and $- a$, a negative quantity; (2) operations to be performed upon magnitudes, as $a \cdot b$, i.e., $b$ multiplied by $a$; (3) relations between magnitudes, as $a > b$, i.e., $a$ is greater than $b$. The following are a few signs in common use:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, are the Hindu numerals.

I, II, III, IV, V, VI, etc., are Roman numerals.

$+$ (plus); $-$ (minus); $\pm$ (plus or minus); $\times$ or (times or multiplied by); $\div$, / or the fraction bar (divided by); $=$ (equal to); $a \equiv b$ ($a$ is identical with $b$); $a \equiv b \pmod{m}$ ($a$ is congruent to $b$, modulo $m$); $a > b$ ($a$ is greater than $b$); $a < b$ ($a$ is less than $b$); $a \backsim b$ ($a$ is similar to $b$); $a \propto b$ ($a$ varies as $b$); $\infty$ (infinity); $a \doteq b$ ($a$ approaches $b$ as a limit); $\therefore$ (therefore); $\because$ (since); $|-a|$ (absolute value of $-a$); $\angle A$ (angle $A$); $\perp$ (perpendicular to); $\cong$ (congruent to, i.e., similar and equal); $\sqrt{\ }$ (root of); $\pi$ (ratio of the circumference of a circle to its diameter); $e$ (base of the hyperbolic logarithms).

**ARITHMETIC COM'PLEMENT.** The difference between a number and the next larger number representing a power of 10. Thus, the arithmetic complement of 7 is 10 − 7, or 3; the arithmetic complement of 85 is 100 − 85, or 15; that of 125 is 1000 − 125, or 875. The arithmetic complement is much used in numerical calculations where differences are to be found. Since $a - b = a + (10^n - b) - 10^n$, it follows that instead of subtracting a number its arithmetic complement may be added, the corresponding power of 10 being then deducted. Thus, $456 - 273 = 456 + 727 - 1000 = 183$. The advantage consists in this, that since the arithmetic complement of a number is easily found by subtracting each digit from 9, except the unit's (which is taken from 10), it is often easier to add the arithmetic complement than to subtract the number. In working with logarithms arithmetic complements are often used instead of their numbers, under the name of co-logarithms. See LOGARITHM.

**ARITHMETIC MEAN.** See MEAN.

**ARITHMETIC TRI'ANGLE.** See PASCAL.

**ARITH'MOGRAPH.** See CALCULATING MACHINES.

**ARITHMOM'ETER.** See CALCULATING MACHINES.

**ARI THORGILSSON,** ä'rē tōr'gēl-sōn (1067–1148). The father of Icelandic literature. Little is known of his life. His *Islendingabók*, the first literary work of the island, was finished between 1134 and 1138, has now perished as a whole, but was apparently an account of the history of Iceland from its settlement, about 870, till 1120. See ICELANDIC LITERATURE.

**ARI'US** (c.256–336). The founder of Arianism, the doctrine that Christ was not of the same essence as God the Father, but was a creature, though the first and highest of creation. He was born in Libya, in north Africa, about 256. He went to Alexandria and there was made deacon and presbyter and was the highly esteemed pastor of a church called, from its shape, the Baucalis (the Greek name of a kind of vase). In 318 he denied the statement which Alexander of Alexandria made upon the Trinity: viz., that there was only a single essence. This he declared was Sabellianism. Defining his own position, he affirmed that if the Son were truly a son, there must have been a time when he was not. For this statement he was applauded by many, but Alexander called a council of 100 Egyptian and Libyan bishops, which condemned Arius and his allies and deposed them (321). The fight had now begun. Arius had numerous supporters, chief of whom was Eusebius, Bishop of Nicomedia. Alexander also rallied a large contingent and wrote numerous letters (two of which are still extant) exhorting the bishops not to receive the heretic. Notwithstanding this active canvass by Alexander, Eusebius of Nicomedia absolved Arius, who had retired to Palestine and then to Nicomedia, from the Alexandrian's condemnation, and had Arius's position approved by a synod held in 323, probably in Nicomedia. Arius wrote *The Banquet*, a work in prose and verse, of which fragments remain. It set forth his view of the person of Christ and put it in a form so that it could be sung to popular tunes. This is said to have aided his cause greatly. The strife attracted the attention of the Emperor Constantine, as it was troubling the peace of the Church. Constantine did not appreciate the importance of the doctrine involved and thought the controversy could be healed by mutual concessions. He empowered Hosius, Bishop of Cordova, who was his ecclesiastical adviser, to represent him in an effort at Alexandria to smooth matters over; but when Hosius reported failure, he took more active measures, and called a general Church council at Nicæa, in Bithynia (325), the first Œcumenical Council, at which the point raised by Arius was settled against him. This result was effected by the champion of Christ's divinity who then appeared—Athanasius, a young deacon of Alexandria, and spokesman for his bishop, Alexander. Three hundred and eighteen bishops, besides numerous other clergy of all grades, were present. Four parties were formed—the strict Arians, led by Arius himself (who was present), who contended that Christ was of different essence (*heteroousios*) from the Father; the strict Athanasians, who contended that he was of the same essence (*homoousios*); the party of Eusebius of Nicomedia; and that of Eusebius of Cæsarea. The creed of the Nicomedian Eusebians was essentially Arian and was rejected by the Council without debate; in fact, the document containing it was torn to shreds. The creed of the Cæsarean Eusebians, which was designed to be a compromise, was respectfully received, as it was an old Church one; but the steady persistence of the Athanasian party forced the Council to reject it and make a new deliverance, in which Arianism was unequivocally condemned. The upshot was that

Arius and his episcopal supporters were banished to Illyria, and his writings publicly burned and interdicted. This action did not, however, end Arianism: and as for Arius, the great influence of Eusebius of Nicomedia and of Constantia, the sister of Constantine, secured his recall in 331, and in a personal interview with the Emperor, Arius convinced him that his views were in substantial agreement with those of Athanasius.

In the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that, as the "Word," he had made all things both in heaven and earth. The Emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive Arius into the communion of the Church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius of Nicomedia was greatly incensed. He called a synod of bishops at Tyre, in 335, which proceeded to depose Athanasius. The Emperor was even prevailed on to remove the latter to Gaul, though he alleged as his reason that he wished to deliver him from the machinations of his enemies. In the same year another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still, the majority of the Christians of Alexandria clung to the doctrines of Athanasius, and resolutely resisted every effort to establish the new opinions among them. Disappointed in his expectations, Arius, in 336, proceeded to Constantinople, where he presented the Emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to Arius the holy communion on the Sunday following. This was naturally considered a grand triumph by Eusebius and his friends; but on the Saturday preceding the day appointed for his restoration, Arius suddenly died of hemorrhage of the bowels.

Arius was exceedingly handsome; but the harassing cares of a life spent in a continual struggle with his adversaries are said to have given him a worn and haggard look. His manners were graceful and modest; he was noted for even an ascetic abstinence, and the purity of his moral character was never challenged by a single enemy.

After the death of Arius his followers rallied round Eusebius of Nicomedia, now Bishop of Constantinople (339), from whom they were styled Eusebians. The reconciliatory middle party of Eusebius of Cæsarea (d.340 A.D.), who wished to end the great controversy by abstaining from all strict dogmatic assertions on the matter, soon dwindled into insignificance between the two contending parties. Constans, who ruled the West after the death of Constantine (337), and Constantius, who ruled the East, made an essay toward reconciliation, but it failed at the Synod of Sardis (347), where the Occidental bishops gathered themselves round Athanasius in support of the *homoousian* doctrine (*identity* or *sameness of substance*), while in a separate council at Philippopolis, the Oriental bishops asserted the *homoiousian* doctrine (implying merely *similarity of substance*). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense and pervaded almost all departments of public and private life. Constantius having, by the death of Constans (350) and his victory over Magnentius (353), gained dominion over the West, the Arian cause, which he favored, triumphed at the Synod of Arelate or Arles (353) and at that of Milan (355). These victories, however, were more apparent than real. The Nicene doctrine had still strong support on its side and was strictly maintained by the banished Athanasius and his friends, while the Antinicæans, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomœoi, or Heterousians, asserted, in the boldest style, their doctrine of "distinct substances." The semi-Arians (a large majority in the Eastern church) maintained the *homoiousian* doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Nicæans. Julian the Apostate (361–363), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, provided they did not interfere with his plans. Jovian and his successors in the West, Valentinian I and Gratian, extended full toleration to both parties. Arianism, at last, was virtually abolished in the Roman Empire, under Theodosius in the East (379–395), and Valentinian II in the West. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Mœso-Gothic language, had been the means of converting the West Goths to Arian Christianity as early as 348, and they adhered to it until the Synod of Toledo in 589. The East Goths, Vandals, Burgundians, the Suevi in Spain, and the Longobards also adopted Arianism; but in all these instances the Nicene doctrine ultimately prevailed, most slowly among the Longobards, who retained the Arian creed until 662. The Arian controversy has never excited any great interest in modern times; yet among Englishmen John Milton was at least a semi-Arian, and it was revived for a time by the writings of the learned Dr. Samuel Clarke (1675–1729) and also by William Whiston (1667–1752). More recently, a part of the Arian doctrine, the denial of "the eternal sonship," was broached in the Wesleyan Methodist church by Dr. Adam Clarke (1762–1832) and a few followers; but it was soon suppressed by the conference. Pure Arianism has gradually lapsed into Unitarianism. Consult: H. Kölling, *Geschichte der arianischen Häresie von Nikata* [325] *bis Konstantinopel* [381] (Gütersloh, 1875–83); J. Gummerus, *Die homousianische Partei bis zum Tode des Konstantius* (Leipzig, 1900); Gwatkin, *Studies in Arianism* (Cambridge, 2d ed., 1900); Harnack, *History of Dogma* (Boston, 1895–97). See ATHANASIUS; CHRISTOLOGY.

**AR'IZO'NA** (probably from the Spanish words *arida zona*, arid zone, or, according to Mowry, from *arizuma*, meaning silver bearing). A State of the southwestern United States, bounded on the north by Utah, on the south by Mexico, on the east by New Mexico, and on the west by California and Nevada (Map: United States, west half, C 4). It lies between lat. 31° 20′ and 37° N. and long. 109° 3′ and 114° 54′ W. It is nearly 350 miles square and contains 113,956 square miles, only 116 of which are under water. Not considering the Territory of Alaska, it ranks fifth in area and forty-fifth in population, forty-sixth if the District of Columbia be taken into account.

**Topography.** The extension northwestward of the Mexican Cordilleras, which rises beyond

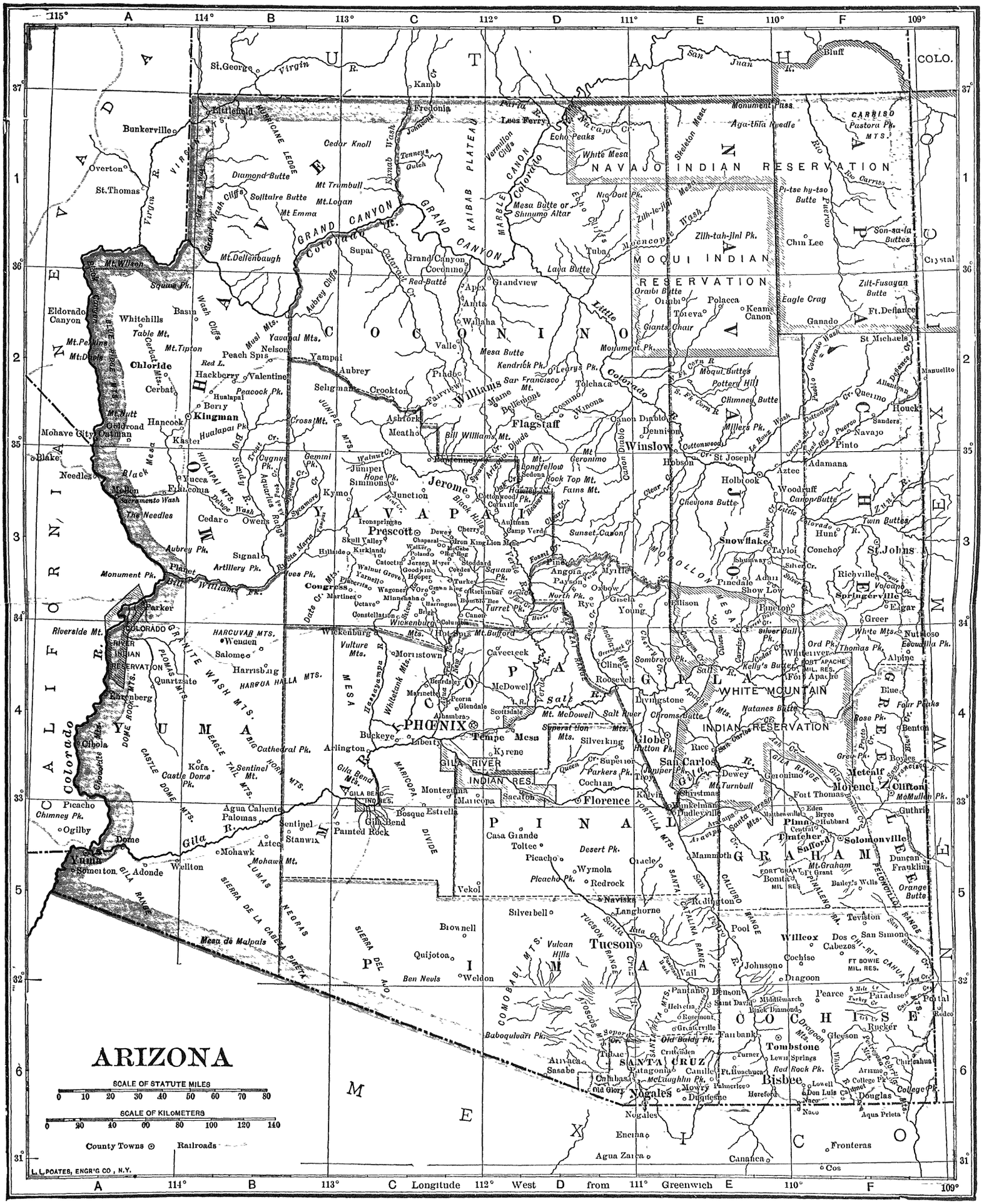
the Colorado River in the Sierra Nevada, divides Arizona diagonally into two regions—a southwestern part of low elevation and a northeastern part consisting of an elevated plateau. The whole State, however, is mountainous in the form of short, isolated ranges having a general northwest-southeast trend, which are abrupt sterile, and gashed by deep canyons and dry watercourses. In the south these mountains rarely reach 3000 feet in height, but in the central and northwestern elevations they are more continuous and lofty, many summits approaching 10,000 feet (Thomas Peak, 11,496; Ord Peak, 10,266; Bill Williams Mountain, 9264, Mount Logan, 7700, Mount Tipton, 7364; Mount Dellenbaugh, 6756, etc.). The highest mountains in the State are in the isolated San Francisco Range, of volcanic origin, in the northern central part, the apex of which reaches 12,794 feet. From these central elevations the State slopes rapidly away nearly to sea level in the Gila valley. The northern part of the State consists of a broken, canyon-cut, hill-studded, arid tableland, the average altitude of which is over 5000 feet above the sea, with many large areas from 6500 to 8000 feet. The few, and often intermittent rivers, which drain this arid region, serving more as the conduits of sudden rain storms than as living watercourses, run in narrow canyons, in some cases a mile or more deep. Evidences of volcanic activity are abundant. The Rio Colorado (see COLORADO RIVER) traversed the northwest corner of the State in such a canyon, and then, turning to the south, becomes the western boundary of Arizona to near its mouth. Its few tributaries, of which the Little Colorado in the north alone is important, reach the river through similar canyons. The whole scenery of this northwestern part of the State is that of a rough, rocky, dry region, interrupted by steep-sided gorges and scarp-fronted mesas and barren mountains, more or less covered with bunchgrass and scattered, stunted trees, and extensive lava flows near the Colorado Canyon. The southern part of the State is, on the whole, even more desert-like in appearance, and all the watercourses (most of which are dry except for a short time after rains) lead downward to the Gila, a broad, shallow river flowing into the Colorado near its mouth. The mountains here are mainly of volcanic origin. The only other rivers in Arizona worth mentioning are the Rio Santa Maria and Sandy, which unite in the central western region to form Bill Williams Fork, which enters the Rio Colorado near lat. 34° N., and the Virgin, in the extreme northwest corner of the State.

**Climate and Soil.** The climate of Arizona is, on the whole, dry and healthful, and it has the largest number of clear days of any part of the Union. The northern plateau region has a mean annual temperature of about 45° F., which is almost the same as that of many of the northern States, but without their extremes; the rainfall here is approximately 20 inches per annum among the mountains but much less on the plateau surface. In the lower lands of the southern half of the State the mean temperature is about that of New Orleans (69° F.) and the hottest weather occurs in the lower Gila valley where the mean temperature in July is 98° F. The rainfall, however, is much less than that in the northern section, scarcely exceeding an average of five inches per annum—the heaviest fall (about 13 inches) being in the district of Tucson. The soil varies from light loam to heavy, dense adobe. In many places along the rivers it is very productive when supplied with water. Elsewhere it is alkaline and lacking in nitrogen and humus matter. The flora and fauna are those of the region extending from southern California around to southwestern Texas. See ROCKY MOUNTAINS.

**Geology.** Northern Arizona consists of a vast series of Carboniferous and Mesozoic marine strata covered by a series of Tertiary lacustrine and terrestrial formations; in all, originally some 15,000 feet thick. A great uplift occurred during Eocene time, and subsequent erosion has carved the land surface into mesas and valleys. A second uplift with much volcanic action occurred about the close of Miocene time. In southern Arizona the changes were not so marked. The State has abundant deposits of valuable minerals, which are described in the paragraph on *Mining*. In Apache County, south of Adamana on the Santa Fe Railroad, are four fossil forests. Trunks of trees to the thickness of four feet are found completely silicified and cracked into blocks of beautiful coloring which are of great value for ornamental purposes. See FOSSIL FOREST.

**Mining.** The natural mineral resources of Arizona are probably surpassed by those of no other State of the Union. Until within a comparatively recent period, however, the difficulty of access and the lack of proper transportation facilities, combined with local causes, have hindered the development of this wealth. The rapid growth of the mining industry in the State indicates that these difficulties are being overcome.

As far back as the time of the Spanish explorers, it was known that copper existed in the region now included within the boundaries of Arizona, but the mining of this metal on a large scale dates only from the early eighties. Production has steadily increased, and in 1910 Arizona took from Montana the first place as a producer of copper ore. The growth of copper production is shown by the following figures: 1883, 23,874,963 pounds; 1899, 133,054,860 pounds; 1904, 191,602,958 pounds; 1910, 297,250,538 pounds; 1911, 303,202,532 pounds; and 1913, 414,593,000 pounds. The value of the product in the last-named year was about $64,000,000. Remarkable increase since 1909 is shown by the fact that the figures of the thirteenth census, which are for that year, show a value of the product of $34,614,116, or hardly more than half the value of the product of 1913. The larger part of the copper is mined in Cochise, Greenlee, Yavapai, Gila, and Pinal counties. The mines in Pinal, Gila, and Greenlee counties produced nearly 49 per cent of the total output in 1912, the output of Pinal County alone increasing 21,449,418 pounds in that year. In Cochise County is the Warren or Bisbee district. Greenlee County embraces the Copper Mountain and Greenlee districts of the Clifton-Morenci region. Yavapai County includes the Verde district with the famous United Verde mines, and Gila County includes the Globe district. In Gila and Pinal counties the low-grade, so called "porphyry" ores, which include deposits in schists, produced 76,748,299 pounds in 1912, compared with 30,636,515 pounds in 1911. There are about 10 copper-smelting plants in regular operation in the State. In 1909 there were 11,394 wage-earners in the copper mines.


ARIZONA
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140
County Towns ⊙ Railroads
L. L. POATES, ENGR'G CO., N.Y.
Longitude 112° West from Greenwich
NAVAJO INDIAN RESERVATION
MOQUI INDIAN RESERVATION
GILA RIVER INDIAN RES.
COLORADO RIVER INDIAN RESERVATION
FORT APACHE MIL. RES.
SAN CARLOS INDIAN RESERVATION
FT BOWIE MIL. RES.
FORT GRANT MIL RES
GRAND CANYON
KAIBAB PLATEAU
MOGOLLON MESA
WHITE MOUNTAIN
MESA DE MALPAIS
SIERRA DEL AJO
SIERRA DE LA CABEZA PRIETA
Colorado R.
Gila R.
Virgin R.
San Juan R.
Little Colorado R.
Salt R.
Verde R.
Bill Williams R.
Big Sandy R.
Santa Cruz R.
San Pedro R.
Gila Bend Mts.
Mohawk Mts.
Lumas Mts.
Negras Mts.
Comobabi Mts.
Baboquivari Pk.
Ben Nevis
Vulcan Hills
Quijotoa
Vekol
Mesa Butte or Shinumo Altar
Zilh-tah-jinl Pk.
Zilh-le-jinl Mesa
Pi-tse hy-tso Butte
Son-sa-la Buttes
Zilt-Fusayan Butte
Eagle Crag
Giants Chair
Monument Pk.
Mesa Butte
Kendrick Pk.
Leurys Pk.
Moqui Buttes
Pottery Hill
Chimney Butte
Millers Pk.
Cedar Knoll
Tenneys Gulch
Diamond Butte
Solitaire Butte
Mt Trumbull
Mt.Logan
Mt Emma
Mt.Dellenbaugh
Red Butte
Lava Butte
Aubrey Cliffs
Mt.Wilson
Squaw Pk.
Table Mt.
Mt.Tipton
Mt.Perkins
Mt.Davis
Red L.
Peacock Pk.
Mt.Nutt
Hualapai Pk.
Cross Mt.
Cugnus Pk.
Gemini Pk.
Hope Pk.
Aquarius Range
Sycamore Creek
Deluge Wash
Sacramento Wash
The Needles
Aubrey Pk.
Signal Mts.
Artillery Pk.
Monument Pk.
Planet Pk.
Bill Williams Pk.
Riverside Mt.
Harcuvar Mts.
Harquahala Mts.
Plomas Mts.
Granite Wash Mts.
Dome Rock Mts.
Castle Dome Mts.
Castle Dome Pk.
Chocolate Mts.
Tank Mts.
Whitetank Mts.
Hassayampa R.
Mesa
Vulture Mts.
Date Cr.
Bradshaw Mts.
Black Hills
Mingus Mt.
Juniper Mts.
Walnut Cr.
Sycamore Cr.
Big Chino Wash
Hualapai Mts.
Music Mts.
Yavapai Mts.
Aubrey Cliffs
Wash Cliffs
Grand Wash Cliffs
Grand Wash
Virgin R.
Muddy R.
Meadow Valley Wash
Las Vegas Wash
Kanab Wash
Johnson Wash
Paria R.
Vermilion Cliffs
Marble Canyon
Echo Peaks
White Mesa
Skeleton Mesa
Monument Pass
Aga-thla Needle
Carriso Pastora Pk.
Carriso Mts.
Rio Puerco
Rio Puerco of the West
Rio Grande
Rio Salado
Colorado Wash
Defiance Cr.
Manuelito
Allantown
Houck
Sanders
Navajo
Pinto
Adamana
Aztec
Holbrook
Woodruff
Cheuons Butte
Canon Butte
Little Colorado R.
Twin Buttes
Hunt
Concho
St.Johns
Richville
Springerville
Volcano
Edgar
Greer
Nutrioso
Escudilla Pk.
White Mts.
Alpine
Whiteriver
Thomas Pk.
Ord Pk.
Silver Ball Pk.
Kelly's Butte
Blue
Four Peaks
Rose Pk.
Benton
Boyles
Metcalf
Morenci
Clifton
McMullen Pk.
Guthrie
Solomonville
Duncan
Franklin
Thatcher
Safford
Pima
Central
Eden
Bryce
Hubbard
Matthewsville
Bonita
Mt.Graham
Bailey's Wells
Orange Butte
Tevis Pk.
Pool
Willcox
Dos Chi-Ri
San Simon
Cabezon
Cochise
Pearce
Paradise
Portal
Rodeo
Rucker
Gleeson
Tombstone
Fairbank
Benson
Pantano
Helvetia
Rosemont
Grandville
Old Baldy Pk.
Tubac
Tumacacori
Calabasas
Sasabe
Atvaca
Patagonia
Crittenden
Camille
Ft.Huachuca
Lewis Springs
Turner
Red Rock Pk.
Bisbee
Lowell
Don Luis
Douglas
College Pk.
Chiricahua
Arizmo
Palmerlee
Hereford
Naco
Nogales
Duquesne
Old Glory
McLaughlin Pk.
Mowry
Encina
Agua Zarca
Cananea
Fronteras
Cos
Aqua Prieta
Tucson
Pima
Casa Grande
Toltec
Picacho
Picacho Pk.
Desert Pk.
Wymola
Redrock
Naviska
Silverbell
Brownell
Langhorne
Radington
Mammoth
Oracle
Oracle Junction
Catalina Range
Santa Rita Mts.
Santa Rita Cr.
Vail
Johnson
Cochise
Diagoon
Pantano
Benson
Saint David
Middlemarch
Black Diamonds
Pearce
Paradise
Portal
Rodeo
Rucker
Gleeson
Tombstone
Fairbank
Old Baldy Pk.
Grandville
Rosemont
Helvetia

Gold mining has not been greatly developed. The production in 1913 was 191,000 ounces, valued at $3,948,000, an increase in value of $175,792 over the product of 1912. Of the output, about 42 per cent came from dry or silicious ore, and most of the remainder from copper ores. The largest production of gold is made in Mohave County, whose mines in 1912 yielded 91,870 ounces. The silver production in 1913 was about 3,773,000 ounces, valued at $2,263,000, an increase of about 8 per cent over the production of 1912. The increase was due largely to increased shipments of lead ore. The greater part of the silver is found in Cochise and Yavapai counties. Over two-thirds of the total output came from copper ore, the remainder from silicious ore and lead ore. Lead is mined in the State in considerable quantities, and the production in 1913 showed a large increase over that of 1912. In the latter year nearly 14,000,000 pounds, valued at $612,000, were produced, compared with 6,806,443 pounds, valued at $306,390, in 1912. About 55 per cent of the lead output comes from Cochise County. The production of zinc (spelter) amounted in 1913 to 9,100,000 pounds, valued at $510,000, which was an increase of 341,758 pounds in quantity, and an advance of about $170 in value over the production in 1912. Nearly 95 per cent of the production came from Mohave County. The total value of the gold, silver, copper, lead, and zinc in 1913 was over $71,000,000, compared with the value of $67,050,785 in 1912. The difference was caused chiefly by the increased copper production. In 1912 there were 445 producing mines, and, in 1911, 397. Other minerals, including mercury, tungsten, vanadium, clays, salt, and precious stones, are also found in the State, but not in sufficient quantities to make them of great importance. In 1913 a deposit of alunite was found in the Nogales region in southern Arizona. The mineral is seldom found pure in nature, but its deposits are important as a possible source of both potash and aluminium.

**Agriculture.** Although Arizona ranks fifth among the States in land area, climatic and soil conditions prevent its being among the important agricultural States. The northern and northeastern portions of the State form a high plateau, rising from 4000 to 8000 feet above sea level with an average elevation of 4100 feet. The southern and southwestern parts of the State, lying within the extremely arid southwestern portion of the United States, consist of broad desert plains, interspersed with parallel ranges of mountains. In the western half of the State precipitation ranges from 1 to 10 inches annually, and in the eastern half from 10 to 25 inches.

Of the entire land area, only 1.7 per cent was in farms in 1910. In the same year the farms numbered 9227, compared with 5809 in 1900. In these tabulations ranges and ranches belonging to the public domain and used for grazing purposes are counted as farms. The land in farms in 1910 was 1,246,613 acres and in 1900 1,935,327 acres, a decline of 35.6 per cent in the decade. The improved farm land, however, increased from 250,521 acres in 1900 to 350,173 in 1910. That farming in the State tends to become more intensive is shown by the fact that the average acres per farm in 1900 was 333.2, while in 1910 it was 135.1.

The value of all farm property in 1910 was $75,123,970. In 1900 it was $29,993,847. This includes land, buildings, and live stock. The average value of property per farm in the two census years was $8142 and $5163, while the average value of land per acre was $33.97 and $5.90.

Of the 9227 farms in the State in 1910, 8366 were operated by owners or managers and 861 by tenants. Of the owned farms, 7038 were free from mortgage. More than one-half averaged from 100 to 174 acres. Native white farmers numbered 5218, and the foreign-born white, 806. The non-whites numbered 3203, of whom 3159 were Indians.

The acreage, value, and production of the principal crops in 1912 and 1909 are shown in the table below. The figures for 1912 were compiled by the United States Department of Agriculture, while those for 1909 are those of the thirteenth census.

| | | Acreage | Production bushels | Value |
|---|---|---|---|---|
| Wheat, | 1912 | 16,000 | 528,000 | $528,000 |
| | 1909 | 15,605 | 298,664 | 293,847 |
| Corn, | 1912 | 23,000 | 707,000 | 778,000 |
| | 1909 | 20,028 | 362,875 | 410,214 |
| Oats, | 1912 | 6,000 | 268,000 | 188,000 |
| | 1909 | 5,867 | 189,312 | 130,384 |
| Potatoes, | 1912 | 1,000 | 125,000 | 156,000 |
| | 1909 | 1,151 | 97,141 | 98,567 |
| Hay, | 1912 | 113,000 | 384,000* | 4,608,000 |
| | 1909 | 102,490 | 259,750 | 2,553,228 |

* Tons.

Hay, including forage of all kinds, constitutes by far the most valuable crop of the State. The chief forage crop is alfalfa, which yields from three to five crops a season.

In 1910, according to the thirteenth census, the cattle in the State numbered 824,929. By far the greater number of these were cattle on grazing ranges, which were being grown for the market. The value of all cattle in 1910 was $4,209,726. Figures of the United States Department of Agriculture for Jan. 1, 1913, show 812,000 cattle on that date. The following figures for other live stock are from these respective sources. Horses, 1910, 99,578; value, $4,209,726; 1913, 108,000; mules, 1910, 3962; value, $399,449; 1913, 5200; sheep, 1910, 1,226,733; value, $4,400,514, 1913, 1,570,000; swine, 1910, 17,208; value, $113,714; 1913, 23,000; poultry of all kinds, 1910, 268,762; value $1,545,966.

The total value of all crops in 1910 was $5,497,000. This was an increase of 122.3 per cent over the value of the preceding year, but this is partly accounted for by higher market prices which prevailed in 1909. In addition to the crops mentioned in the table above, there are other agricultural and horticultural products of considerable value. Orchard fruits are grown in limited areas. The value of these in 1909 was $241,110. Apples, peaches, and pears are the most important. Small fruits are grown in limited areas. The value of these in 1909 was $12,987. Strawberries made up the most of this total. The growing of sugar beets is becoming an industry of importance. In 1900 there was no reported production, but in 1910 the product was valued at $237,000.

**Irrigation.** The successful cultivation of practically all farm land in the State is possible only by irrigation. In 1909, 4,841 farms containing 320,051 acres, or 91.4 per cent, of all the improved farm land were irrigated. In the

following year, existing irrigating enterprises were ready to supply water to 387,655 acres. There were in the latter year 1267 independent irrigating enterprises, with 2597 miles of ditches; 402 reservoirs, with a capacity of 1,349,938 acre feet of water, and the cost of the enterprises to July 1, 1910, was $17,677,966. On March 18, 1911, the Roosevelt storage dam was opened. This dam, which is 283 feet high, creates a great artificial lake, whose waters will reclaim more than 200,000 acres of arid land. The immense Yuma irrigation project, which is partly in California, was approaching completion in 1913. See IRRIGATION; RECLAMATION; DAMS.

**Stock Raising.** The raising of cattle for market on the grazing lands of the State has always been its most important agricultural industry. Although stock raising will probably maintain its relative importance for many years, similar conditions to those which have affected the industry in other Far Western States promise to bring about radical changes. The government has taken over for national forests large areas which were heretofore free for grazing. Other portions have been taken for cultivation, and, as the irrigation projects continue to be completed and put in operation, still larger tracts of land which have hitherto been adapted only for grazing purposes will be available for cultivation. The pasture lands of the State are confined chiefly to the northern plateau. Rainfall in the southern portion is insufficient for the growth of grasses, except under a few mountain slopes.

Of the total number (824,929) of cattle in the State in 1909, only 28,862 were classified as dairy cows which were kept for milk. Practically all other cattle were being raised for market. All classes of cattle except calves increased during the decade 1900–10. The total value of cattle was in 1909 $14,624,708. Of this amount $1,273,076 was the value of dairy cows. In 1906 the beef cattle on the ranges numbered 590,000, as compared to 384,091 in 1910.

As in the other Far Western States where cattle raising has been a leading industry, changing conditions have made the raising of sheep more profitable. In 1906 the sheep on the ranges numbered 734,000, while in 1910 they numbered 1,226,733, and in 1913, according to United States Department of Agriculture, 1,570,000.

**Manufactures.** Manufacturing industries are, as is to be expected, little developed. They are chiefly connected with the smelting and refining of copper. That there has been a healthy growth in manufacturing, however, is shown by the relative figures for 1904 and 1909. In the former year there were 169 manufacturing establishments in the State, while in the latter year these had increased to 311. The industries, as a whole, showed a much greater development during the five-year period, 1904–09, than during the period 1899–1904. While the number of establishments increased 84 per cent and the value of the products 79 per cent, from 1904 to 1909, the average number of wage-earners increased only 34.4 per cent, and the value added by manufacture 23.5 per cent. The comparatively low percentage of increase in value on all manufactures is due largely to figures reported for the copper-smelting and refining industry. Manufacturing operations in this industry frequently are so closely related to those of mining that it is not always possible to separate mining and manufacturing expenses. Increased volume of manufactures during the period 1904–09 can be attributed to some extent to the increase in the price of commodities that took place during that period. The essential facts in regard to manufactures in the State in 1909 and 1904 are shown in the following table:

COMPARATIVE SUMMARY FOR 1909 AND 1904

| INDUSTRY | Census | Number of establishments | PERSONS ENGAGED IN INDUSTRY: Total | Proprietors and firm members | Salaried employees | Wage-earners (average number) | Capital | Salaries | Wages | Value of products |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Expressed in thousands | | | |
| All industries | 1909 | 311 | 7,202 | 261 | 500 | 6,441 | $32,873 | $798 | $5,505 | $50,257 |
| | 1904 | 169 | 5,217 | 133 | 291 | 4,793 | 14,396 | 472 | 3,969 | 28,083 |
| Bread and other bakery products | 1909 | 40 | 164 | 45 | 7 | 112 | 133 | 6 | 96 | 478 |
| | 1904 | 16 | 91 | 24 | 1 | 66 | 85 | | 53 | 245 |
| Butter, cheese, and condensed milk | 1909 | 11 | 75 | 1 | 16 | 58 | 240 | 22 | 51 | 538 |
| | 1904 | 5 | 39 | 2 | 7 | 30 | 180 | 7 | 22 | 267 |
| Cars and general shop construction and repairs by steam railroad companies | 1909 | 10 | 1,141 | .... | 52 | 1,089 | 677 | 77 | 976 | 2,394 |
| | 1904 | 7 | 1,198 | ... | 39 | 1,159 | 523 | 54 | 961 | 1,329 |
| Flour-mill and gristmill products | 1909 | 10 | 75 | 4 | 17 | 54 | 674 | 26 | 42 | 1,317 |
| | 1904 | 9 | 50 | ... | 14 | 36 | 404 | 18 | 24 | 743 |
| Ice, manufactured | 1909 | 23 | 152 | 9 | 26 | 117 | 1,080 | 28 | 112 | 501 |
| | 1904 | 13 | 97 | 12 | 13 | 72 | 420 | 12 | 55 | 256 |
| Lumber and timber products | 1909 | 23 | 911 | 30 | 42 | 839 | 2,342 | 106 | 639 | 1,419 |
| | 1904 | 9 | 576 | 8 | 26 | 542 | 1,469 | 56 | 413 | 1,037 |
| Printing and publishing | 1909 | 64 | 408 | 51 | 89 | 268 | 680 | 104 | 232 | 784 |
| | 1904 | 50 | 269 | 37 | 43 | 189 | 397 | 51 | 161 | 470 |
| Smelting and refining, copper | 1909 | 8 | 3,268 | . .. | 139 | 3,129 | 21,487 | 310 | 2,776 | 41,059 |
| | 1904 | 7 | 2,456 | .. | 107 | 2,349 | 9,341 | 218 | 2,050 | 22,762 |
| All other industries | 1909 | 122 | 1,008 | 121 | 112 | 775 | 5,560 | 119 | 581 | 1,767 |
| | 1904 | 53 | 441 | 50 | 41 | 350 | 1,577 | 56 | 230 | 971 |

It will be seen from this table that the average number of wage-earners in Arizona in 1909 was 6441, and of these 3129 were engaged in indus-

tries connected with the smelting and refining of copper. Of the wage-earners in 1909 only 38 were females. There were but 37 persons under 16 years of age employed in the manufacturing industries. In addition to the industries mentioned in the table above are the Portland cement mines at Roosevelt, which are operated in connection with the Salt River irrigation project. This is one of the largest industries in the State, and the value of this product in 1909 was $214,132. Unlike conditions in most other States, manufacturing industries in Arizona are not centred chiefly in the largest towns. Phœnix and Tucson are the only incorporated places having a population of 10,000 or over. In these two cities are included only 92 manufacturing establishments, while in the outside districts there are 219. The value of the products of the industries in the two cities in 1909 was $3,503,762, while for the outside districts it was $46,752,932.

**Transportation.** The lower course of the Colorado constitutes the only navigable waters of the State. The Southern Pacific, running across the southern end of the State, the Santa Fe Pacific across the northern end, and the Santa Fe, Prescott, and Phœnix connecting the two, are the principal railroads. The mileage has increased from 349 miles in 1880 to 1094 miles in 1890, to 1465 miles in 1899, and to 2135 in 1913. There were 54.19 miles of electric railways in 1913.

**Banks.** In 1912 there were 51 banks, whose deposits totaled $22,014,683. In the number were included 13 national banks with deposits of $7,156,621, 25 State banks with deposits of $8,919,935, and 1 savings bank with deposits of $429,709.

**Finance.** The State constitution provided for a State board of equalization, to consist of the chairman of the Board of Supervisors of the various counties, and the State Auditor. A board of equalization was provided for each county, consisting of the board of supervisors in these counties. An amendment to the constitution, ratified in November, 1912, allowed the Legislature to prescribe a method of assessment, equalization, and levy of taxes. The State Tax Commission was created by the same Legislature, and a graduated collateral inheritance tax law was passed. The constitution exempts from taxation all Federal, county, State, and municipal property. The property of educational, charitable, and religious associations or institutions not used or held for profit may also be exempted from taxation. The receipts for the fiscal year ending June 30, 1913, were $3,825,367, and the disbursements $3,193,352. At the beginning of the year there was a balance on hand of $411,441, leaving, at the end of the fiscal year 1913, a balance of $1,073,456. The chief revenue was from taxes, and the total amount collected by county taxation in 1913 was $1,252,573. The chief expenditures were for the support of State institutions for education and for the administration of the State government. The bonded indebtedness of the State at the end of the fiscal year 1913 was $2,098,302.

**Education.** The State constitution provided for passage by the Legislature of laws for the establishment and maintenance of a general and uniform school system, including kindergarten, common, high, normal, and industrial schools, a University which should include an agricultural college, a school of mines, and other technical schools. In accordance with this provision, the Legislature of 1912 passed an educational code. The general conduct and supervision of the public school system of the State is vested in a State Board of Education, a State Superintendent of Public Instruction, and County School Superintendents. The Board of Education is composed of the Governor, the Superintendent of Public Instruction, the president of the university, and principals of State normal schools. A permanent school fund for the use of the common schools is derived from the sale of public school lands or other public lands and from other sources. The income derived from this fund is apportioned annually to the various counties of the State, in proportion to the various number of pupils of school age residing therein. The revenue for the maintenance of the State educational institutions is derived from the investment of the proceeds of the sale and from the rental of certain lands set aside for the use of the respective institutions. In addition to this income the Legislature is authorized to make appropriations to be met by taxation, to insure the proper maintenance of all State educational institutions, and is empowered to make such special appropriations. Laws passed by the Legislature of 1912 provide for free text-books in public schools, for county scholarships in the State university, and for the retirement on a pension of $600 a year of any teacher who has served in the public schools for 25 years or more. In the school year 1912–13 the school population of the State was 46,681. Of these 35,160 were enrolled, and the average attendance in the schools was 25,003. The average length of the school year was eight months. Total revenue for educational purposes for the year was $1,876,647, and expenditures $1,321,595. The proportion of illiterates is comparatively large. Of the total population of 10 years and over in 1910, 20.9 per cent were illiterate, as compared with 29 per cent in 1900. The large proportion of illiterates is accounted for chiefly by the large number of Mexicans. The census taken in 1910 showed a school population from 6 to 20 years inclusive of 56,897. Of this number 29,496 were males and 27,401 females. Total school attendance in that year was 30,355: 15,472 males and 14,883 females. The attendance of the urban schools was 7512; rural schools, 16,179.

**Charitable and Correctional Institutions.** These include the State prison at Florence, the State Industrial School, the State Insane Asylum at Phœnix, the Home for Aged and Infirm Arizona Pioneers at Prescott, and the Florence Crittenden Home at Phœnix; and The Arizona Children's Home at Phœnix. A new building for the State prison was erected in 1912–13. The United States government donated to the State the site of Fort Grant near Willcox, and to this place the State Industrial School, formerly at Benson, was removed. The Legislature of 1912 passed a child-labor law and a parole law. The latter provided for an indeterminate sentence for prisoners and for a Board of Commissioners of paroled prisoners. An act was passed, making it a felony for a parent to fail to provide his or her minor child with necessaries and making it a felony for a husband to abandon his wife or fail to provide for her. Another measure provided for the commitment of destitute, homeless, and depraved women, and neglected, abandoned, and homeless children, to the Florence Crittenden Home at Phœnix. An-

other act provided for the care, maintenance, and instruction of blind children under school age.

**Religion.** The Catholics were first in the field. As early as 1687 the Jesuits had established missions and schools in the State and have been always active in the propagation of their faith. This sect still constitutes a large percentage of the church membership of the State. In recent years the State has been colonized by Mormons, who now rank next to the Catholics in numbers.

**Population.** The population of Arizona by decades is as follows: 1870, 9658; 1880, 40,440; 1890, 88,243; 1900, 122,931; 1910, 204,354; 1920, 333,903. Of the total population in 1910, 171,468 were white, 29,201 were Indians, 2009 were negroes, 1305 were Chinese, and 371 were Japanese. Native whites numbered 124,744; those of native parentage, 82,478; foreign parentage, 26,170; mixed parentage, 16,260; and rural, 141,094. Of foreign-born whites, by far the larger number were Mexicans; these numbered 51,102, or over half the total foreign-born population. The population was divided by sexes as follows: Males, 118,574; females, 85,780, or 138.2 males to every 100 females. The males of voting age numbered 74,051. The nine incorporated cities in the State, with their population in 1910, are: Phœnix, the capital, 11,134; Tucson, 13,193; Bisbee, 9019; Clifton, 4874; Douglas, 4437; Globe, 7083; Nogales, 3514; Prescott, 5092; Yuma, 2914.

**Indians.** The Indians in the State in 1910 numbered 29,201, compared with 26,480 in 1900. Of the total in 1910, only 773 were in incorporated towns, the remainder living on reservations. By far the greater number belonged to the Navajo tribe. They are nearly all engaged in agricultural pursuits, and their condition has greatly improved in recent years.

**Militia.** The total number available for military duty in 1910 was, according to the thirteenth census, 58,962. The organized militia is comprised in a regiment of infantry called the First Infantry, and a troop of cavalry, Troop A. The combined strength of these in 1912 was 663. The official designation of the militia is the National Guard of Arizona.

**Government.** The constitutional convention which was in session at Phœnix from Oct. 15 to Dec. 9, 1910, adopted a constitution which was ratified by the people at a special election held Feb. 9, 1911. Certain features, chiefly the provision for the "recall" of judges, led to President Taft's refusal to give his approval until the objectionable features were eliminated. (See *History* below.) Congress thereupon passed a resolution which required the people to adopt an amendment omitting judicial officers from the clause providing for recall. This amendment was adopted at a general election held on Dec. 12, 1911. The action of President Taft was rendered null and void by the adoption of an amendment on Nov. 5, 1912, which restored the original clause by which the recall is applicable to all elective officers.

*Legislative.*—Legislative authority is vested in a Senate and House of Representatives. To the people is reserved the power of proposing laws and amendments to the constitution, and to enact or reject laws or amendments at the polls, independent of the Legislature; and to them is also reserved, for use at their own option, the power to approve or reject at the polls any act or item, section, or part of any act, of the Legislature. These reserved powers constitute the initiative and referendum. Under the initiative 10 per cent of the qualified electors have the right to propose any measure, and 15 per cent have the right to propose any amendment to the constitution. Under the referendum the Legislature, or 5 per cent of the qualified electors, may order the submission to the people at the polls of any measure or item, section, or part of any measure, enacted by the Legislature, except laws immediately necessary for the preservation of the public peace, health, or safety, or for the support and maintenance of the departments of the State government and State institutions. Any measure or amendment to the constitution proposed under the initiative, and any measure to which the referendum is applicable, is referred to a vote of the qualified electors, and becomes a law when approved by a majority of the votes cast thereon and upon proclamation of the Governor and not otherwise. The veto power of the Governor does not extend to initiative or referendum measures approved by a majority of the qualified electors.

The Senate consists of 19 members, and the House of Representatives of 35 members. Members of the Legislature must be citizens of the United States at the time of election, and be at least 25 years of age, and residents of Arizona at least three years, and of the county of which they are elected at least one year before election. Regular sessions of the Legislature are held biennially, the Governor having power to call special sessions whenever advisable.

*Executive.*—The executive department consists of the Governor, Secretary of State, State Auditor, State Treasurer, Attorney-General, and Superintendent of Public Instruction, and all hold office for two years. No person is eligible to succeed himself in the office of State Treasurer for two years after the expiration of the term for which he shall have been elected. The salaries of the executive officers are as follows: Governor, $4000; Secretary of State, $3500; State Auditor, $3000; State Treasurer, $3000; Attorney-General, $2500; Superintendent of Public Instruction, $2500.

*Judiciary.*—Judicial power is vested in supreme courts, superior courts, justices of the peace, and such courts inferior to the superior court as may be provided by law. The supreme court consists of three judges, a majority of whom constitutes a quorum, which is necessary for decision. Judges of the supreme court are elected at a general election, and their term of office is coterminous with that of the Governor of the State elected at the same time; and the one receiving the highest number of votes is chief justice.

*Suffrage and Elections.*—The constitution, as originally adopted, provided that no person should be entitled to vote at a general election upon any question submitted to a vote of the people (except school elections), unless such person was a male citizen of the United States of the age of 21 years or over. An amendment to the constitution adopted Nov. 5, 1912, extended full suffrage to women. Nominations for candidates for all elective, State, county, and city offices, including representatives for Congress, are made under a direct primary election law. Up to the time of the adoption by the States of the constitutional amendment providing for the direct election of Senators, the nomination of United States Senators was also controlled by the direct primary election law. There are

stringent measures to provide for purity of elections and to guard against abuses of the elective franchise. There is a law providing for general publicity before and after election of all campaign contributions to, and expenditures of, campaign committees and candidates for public office.

Every public officer in the State holding an office, either by election or appointment, is subject to recall from such office by the qualified electors of the district from which candidates are chosen. Twenty-five per cent of those who voted at the last preceding general election for all of the candidates for the office held by such officer may by petition, which shall be known as a recall petition, demand his recall. Every recall petition must contain a general statement of not more than 200 words of the grounds of such demand. No petition shall be circulated against any officer until he shall have held his office for a period of six months, except that it may be filed against a member of the Legislature at any time after five days from the beginning of the first session after his election.

*Local and Municipal Government.*—Any city with a population of over 3500 has the power to frame a charter for its own government. Municipal governments are forbidden to grant, extend, or renew a franchise without the approval of a majority of the qualified electors residing within their corporate limits, who shall vote thereon at a general or special election; and no franchise must be granted, extended, or renewed for a longer time than 25 years. By an amendment to the constitution adopted Nov. 25, 1912, no county, city, town, school district, or other municipal corporation may for any purpose become indebted in any manner to an amount exceeding 4 per cent of the taxable property without the consent of a majority of the property taxpayers, who must also be qualified electors. Exceptions to this law are made in the matter of indebtedness for water, artificial light, or sewer need, and controlled by the municipality.

**Miscellaneous.** The constitution prohibits plural or polygamous marriages, and the sale or gift of intoxicating liquors to Indians. Public service corporations are supervised by a State Corporation Commission. The Legislature of 1912 passed an elaborate public-service corporation act. The lawful day's work in all employment by the State is eight hours. The employment of children under 14 during school hours, and of children under 16 in mines, is forbidden. It also passed an employers' liability act applying to dangerous occupations. Columbus Day was made a legal holiday, and a State laboratory for the analysis of food and drugs was established. A pure food law was enacted in 1913.

**History.** Long before its discovery by white men, Arizona was inhabited by a powerful race, whose ruined cities, aqueducts, and fortifications dot the valleys and canyons of the State. In 1539 Fray Marcos de Niza, with a companion, left the City of Mexico to explore the country now included in Arizona and New Mexico, being stimulated by rumors of its mineral wealth, and of its populous Seven Cities of Cibola. The report brought back was so favorable that in 1540 Vasquez de Coronado led an expedition thither, visiting the Moqui villages and New Mexican pueblos. What is now Arizona was very sparsely settled before the beginning of the nineteenth century. In 1772 there were only two missions, with three *visitas*, and two incipient towns, Tucson and Tubac. The hostility of the Apaches and other tribes prevented all advance, and outbreaks in 1802 and 1827, added to the disorder attending the Mexican Revolution, led to the abandonment of the mines and ranches and of all settlements, excepting Tucson and Tubac. By the Treaty of Guadalupe-Hidalgo, Feb. 2, 1848, Arizona, then included in New Mexico, became the property of the United States, except the tract south of the Gila, which was a part of the Mexican State of Sonora and was not acquired till Dec. 30, 1853. (See GADSDEN PURCHASE.) On Feb. 24, 1863, Arizona was separated from New Mexico and made a Territory. Indian troubles broke out as late as 1896, and tended in some degree to hinder the development of the country, but the population of the State has steadily increased as larger tracts of desert land have been reclaimed by irrigation and the mineral resources of the region have been utilized. On Dec. 1, 1891, a constitution was adopted by the people in anticipation of admission to the Union as a State, but Congress refused to grant the application.

In 1904–05, and again in 1905–06, Congress passed bills providing for the admission of Arizona and New Mexico as one State. This proposal met with strong objections in Arizona, and in 1906 the voters of the State rejected it. President Roosevelt thereupon declared that he would make no further effort to have the two Territories admitted as a single State. In 1908 a bill providing for the admission of Arizona separately was passed in the House of Representatives, but on account of charges of corruption and bribery on the part of leading officials in the Territories, it met such strong opposition in the Senate that it was dropped. Agitation for the admission of the Territories continued, both within Congress and outside, until on Jan. 20, 1910, an Enabling Act was passed and signed by President Taft. This act authorized the Governor of Arizona to call for the election of delegates for a constitutional convention, to prepare a constitution for the new State. This election was held on Sept. 12, 1910, and resulted in the election of 44 Democrats and 8 Republicans as delegates. The constitutional convention was in session from Oct. 15 to Dec. 9, 1910. The constitution prepared by this body was probably the most radical instrument ever formulated for the administration of a State. Among other provisions was included one for the recall of judges. The constitution was ratified on Feb. 7, 1911, by vote of 12,000 in its favor to 7500 against it. At the first session of the Sixty-second Congress, a joint resolution was passed which provided for the admission of the State and tacitly admitted the right of the people to pass as radical a constitution as they wished. This resolution was vetoed by President Taft in a message in which he severely criticised the provision for the recall of judges, and declared that he would never give his assent to a constitution which contained this provision. Congress thereupon passed another joint resolution, providing for the admission of Arizona as a State on condition that the provision for the recall of judges should be eliminated. The objectionable section was eliminated on Dec. 12, 1911, by a vote that was practically unanimous. The proclamation for-

mally admitting Arizona to the Union as a State was signed on Feb. 14, 1912. At the election held on Dec. 12, 1911, officers and a member of Congress for the new State were elected. An advisory vote for United States Senators was also taken. State officers had been nominated at a primary election held in March, 1911. The Democrats elected the entire State ticket, headed by George W. P. Hunt for Governor. The candidates for the United States Senator receiving the highest votes were Marcus A. Smith and Henry F. Ashurst. The Legislature elected included 15 Democrats and 4 Republicans in the Senate, and 30 Democrats and 5 Republicans in the House. Governor Hunt was inaugurated on Dec. 31, 1911. On March 27, 1912, the Legislature elected Marcus A. Smith and Henry F. Ashurst United States Senators. The result for the vote for President in Nov. 5, 1912, was: Wilson, 10,324; Roosevelt, 6949; Taft, 3021. As noted above, an amendment provided for woman's suffrage was carried at this election, as well as an amendment to the constitution restoring the provision for the recall of judges. The Legislature which met in 1913 passed measures restricting the ownership of land by aliens, intended to eliminate the ownership of land in the State by Japanese. These provisions were similar to but more severe than those passed by the Legislature of California in 1913. (See CALIFORNIA, *History.*) In spite of the protest by the Japanese government the bill was signed by Governor Hunt.

Following is the list of governors:

TERRITORIAL

| | | |
|---|---|---|
| John N. Goodwin | Republican | 1863–65 |
| Richard C. McCormick | " | 1865–69 |
| A. P. K. Safford | " | 1869–77 |
| John P. Hoyt | " | 1877–78 |
| John C. Frémont | " | 1878–81 |
| John J. Gosper | " | 1881–82 |
| Frederick A. Tritle | " | 1882–85 |
| C. Meyer Zulick | Democrat | 1885–89 |
| Lewis Wolfley | Republican | 1889–90 |
| John N. Irwin | " | 1890–92 |
| Nathan B Murphy | " | 1892–93 |
| Louis C. Hughes | Democrat | 1893–96 |
| Benjamin J. Franklin | Republican | 1896–97 |
| Myron H McCord | " | 1897–99 |
| Nathan B. Murphy | " | 1899–1902 |
| Alexander O Brodie | " | 1902–05 |
| Joseph H. Kibbey | " | 1905–09 |
| Richard E. Sloan | " | 1909–11 |

STATE

| | | |
|---|---|---|
| G W. P. Hunt | Democrat | 1911–17 |
| Thomas Campbell | Republican | 1917– |

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**ARIZONA,** UNIVERSITY OF. A State university at Tucson, Ariz., established by act of the Legislature in 1885 and opened in 1891. It had in 1913 buildings and grounds valued at $450,000; a library of 20,000 volumes and 15,000 pamphlets; a faculty of 42; and 180 collegiate, 71 sub-collegiate, and 77 non-collegiate students. It receives $50,000 annually from the United States government and $120,000 (approximately) from the State. It maintains departments of liberal arts, agriculture, civil, electrical, mechanical, and mining engineering, commerce, and home economics. President, A. H. Wilde, Ph.D.

**ARJISH,** ür-jēsh'. See ERJISH DAGH.

**ARJISH,** or AKHLAT. A small town of Turkish Armenia, vilayet of Erzerum, on the north shore of Lake Van (Map: Turkey in Asia, K 3). Pop., about 4000. The modern Arjish consists of three parts. The fortress, with near-by mosques and houses, is on the shore of the lake. The old city, at a little distance from the present town, in a ravine, was the residence of the kings of Armenia and was the scene of many conflicts between Greeks, Armenians, and Persians. It was taken and devastated in 1229 by Jelal-ed-Din and completely destroyed by an earthquake in 1246. The residential portion, containing the gardens, is on an upper level. Arjish is the seat of an Armenian bishop.

**AR'JUNA,** *Hind. pron.* ŭr'jōō-nä. The grandson of Indra, and the hero of episodes in the *Māhabhārata*, one of the two national epic poems of India. Next to Krishna, he is the chief personage in the Bhagavad-gita, the poetic episode of the *Māhabhārata* in which the religious and philosophical beliefs of India have found their most popular expression.

**ARK.** In the English version of the Bible the word is applied to three different objects: 1. To the craft which Noah built and in which he preserved himself, his family, and numerous animals alive during the flood. It is described in Gen. vi. It was of "gopher wood," which is perhaps conifer cypress, of which the Phœnicians built ships, and the "pitch" used was asphalt. Its dimensions were, in English measure: Length, 525 feet; breadth, 87½ feet; height, 52½ feet. It was not built for speed and merely floated about until the waters subsided. 2. To the basket of bulrushes (papyrus reed) daubed with slime, prepared by the mother of Moses, in which Moses floated on the Nile until Pharaoh's daughter rescued him (Ex. ii. 3 et seq.). 3. To the Ark of the Covenant (q.v.).

**AR'KADEL'PHIA.** A city and the county-seat of Clark Co., Ark., 65 miles southwest of Little Rock, on the St. Louis, Iron Mountain, and Southern Railroad and on the Ouachita River (Map: Arkansas, C 3). Arkadelphia, 300 feet above sea level, has good natural drainage and water power. Its manufactures comprise the products of lumber, stove, roller, and cotton mills, and foundry and machine shops. It is the site of Ouachita College (Baptist) and Henderson College (Methodist), founded 1886 and 1890, respectively, and has Baptist and Presbyterian schools for colored pupils, and a public library.

The charter of Arkadelphia, in effect since 1873, provides for a biennially elected mayor and a city council. Pop., 1890, 2455; 1900, 2739; 1910, 2745.

**ARKANSAS,** är'kan-są (popularly known as the "Bear State"). A south central State of the United States, bounded by Missouri on the north, the Mississippi River (which separates it from Tennessee and Mississippi) on the east, Louisiana on the south, and Oklahoma and Texas on the west, with Texas touching the southwest corner. Nearly a square, each side measures about 250 miles. Its area is 53,335 square miles, of which 810 square miles are water. Among the States of the Union it ranks twenty-sixth in area and twenty-fifth in population.

**Topography and Drainage.** Excepting a few high ridges and the Grand Prairie of Lonoke, Prairie, and Arkansas counties, the eastern margin of the State is subject to inundation from the Mississippi River. But the region to the westward attains a higher elevation, and the surface is broken by numerous ranges of hills and low mountains, which have a general trend from east to west. These highlands cover almost half of the State. The mountains in the northwest are a part of the Ozark uplift, being continuous with the elevations in Oklahoma to the west and Missouri to the north. The highest points in the State do not exceed 2800 feet. The lowlands in the east and southeast have an average elevation of a little over 200 feet. The Arkansas River bisects the State from northwest to southeast and joins the Mississippi. The White River enters the State from southwestern Missouri, flows toward the southeast, receives the Black and Cache rivers from the north, and joins the Arkansas near its mouth. The Ouachita, Saline, and Bartholomew, tributaries of the Red River, drain the southern part. The Arkansas is navigable for boats of light draught throughout its course within the State; the White for 260 miles; the Ouachita and Bartholomew each for 150 miles; the Saline, Red, and Black each for 100 miles, making a total of some 3000 miles of waterways. The upper courses of some of the streams furnish water power.

**Climate.** Comparatively mild, the climate is pleasant and healthful. The snowfall is light, and prolonged droughts are unknown. The mean rainfall for the State is 40 inches; at Fort Smith, 46.5 inches. The heaviest annual rainfall is 54 inches in the region of the Ouachita Mountains. Mean temperatures for January and July respectively are as follows: At Little Rock (central), 40.8 and 80.3°; at Fort Smith (northwest), 36.1 and 80.0°.

**Soils.** The hill country of the northwestern part of the State has little land of agricultural value, the soil being sandy and thin; but the bottom lands are very productive. In the limestone regions are found much red clay and loam, the residual materials from the decomposition of the limestone. The higher lands of the Arkansas valley, from Fort Smith to Little Rock, are composed of a dark sandy loam. Below Little Rock a sandy, sometimes clayey, soil borders the river, and this grades toward the south into black, sandy, and "buckshot" soils, which are the richest in the State and which yield from 2000 to 3000 pounds of seed cotton to the acre. The bottom lands of the Red River valley contain a black sandy loam or a red sticky clay called "gumbo." A yellow loam is characteristic of some of the southern counties, which are underlain by deposits of the Tertiary Age.

**Geology and Mineral Resources.** A line drawn from a little north of Texarkana in the southwestern corner, through Little Rock to Pocahontas in the northeast, divides the State into two approximately equal parts; the northwestern portion is underlain by Paleozoic rocks, with a small area of Cretaceous in its southernmost corner; the southeastern portion is occupied by the less consolidated strata of Tertiary and Post-Tertiary ages. The Paleozoic area is essentially the "hill country"; the Tertiary district is a part of the coastal plain. The oldest rocks known in the State are of the Ordovician or Lower Silurian Age. They extend over the line from Missouri and lie on the southern flanks of the Ozark uplift, and consist of sandstones, quartzites, and limestones, the latter in the upper part of the series. They furnish good building stones, quartz sand for glass making, and lime. Along the southern boundary of the Ordovician formations, in the vicinity of Batesville and Cushman in Independence and Izard counties, are deposits of manganese ore which have been worked to some extent. Another area of Ordovician rocks is found in the Ouachita Mountains west of Little Rock. In these mountains are large masses of a silicious rock, novaculite, from which are made the finest known whetstones, called in the markets "Arkansas" and "Ouachita" stones.

These whetstones are obtained in Garland, Howard, Hot Springs, Montgomery, Polk, Pulaski, and Saline counties, and their quarrying constitutes an important industry. In connection with the Ordovician rocks of the Ouachita uplift are found some deposits of manganese ore, but these are of little importance compared with those of the Batesville region. Around the edges of the Ordovician area of the northern part of the State is a narrow strip of Silurian limestone, the St. Clair limestone, that furnishes a fine quality of pink marble useful for ornamental purposes. The Devonian formation is poorly developed. It is known as the Eureka shale and the Sylamore sandstone, but is of importance for the reason that in connection with it are found phosphate deposits which give promise of yielding valuable returns. Despite reports, the State geologist says that there is little gold or silver in the Ouachita Mountains. Deposits of zinc blende have been discovered in Sevier County, and other occurrences of this ore, as well as of galena, are known in the northwestern part of the State. Aluminum ore in the form of bauxite occurs near Little Rock and farther west at Bryant in Saline County. Iron ores are of little importance, though they are found, at many places, in the form of limonite. Nickel is also known, but sparingly, in Saline County. The coal measures cover large areas and furnish a good quality of bituminous coal in abundance. Oil and gas have been found only in small amount. In the Cretaceous and Tertiary areas no metals have been found, but there are deposits of lignite and greensand.

Igneous rocks of great geologic interest are found at Magnet Cove and Fourche Mountain, in the eastern end of the novaculite region near Hot Springs. Mineral springs are common especially so in the Ouachita Mountains. Those at Hot Springs are famous for their medicinal

qualities and have led to the foundation there of a renowned health resort. Another hot spring has been discovered in Montgomery County. Mammoth Spring, in Fulton County, is one of the largest in the world and is reported to discharge 9000 barrels of water a minute.

**Mining.** For various reasons, such as lack of interior transportation facilities, mining in Arkansas has not progressed to an extent which its mineral resources warrant. It has, however, shown continual development in some directions. Coal is the chief mineral product. In 1912 coal production in the State was 2,120,000 short tons, compared with 1,950,000 short tons in 1911 and 2,220,000 in 1906. That the coal-mining industry has shown no marked increase in recent years is shown by the fact that the production in 1906 was 2,220,000 tons. Zinc is produced in considerable quantities. The value of the product of this mineral in 1912 was $105,222. Lead is produced in small quantities. The product of 1912 was valued at $2792. The State is a large producer of bauxite. Of this mineral there were mined, in 1912, 126,105 long tons, valued at $768,932, compared with 125,448 tons, valued at $750,649, in 1911. This figure included a small percentage mined in Tennessee. Arkansas is the only State in which diamonds have been found in any considerable quantity. The first discovery was made Aug. 1, 1906, near the mouth of Prairie Creek in the vicinity of Murfreesboro, Pike County, and since that time, approximately 1655 stones aggregating 550 carats have been found in this locality. Further search has resulted in the finding of three new areas in the same neighborhood. In 1913 a plant to wash the diamond-bearing earth was being erected near the mouth of the Prairie Creek. Among other minerals found are phosphate rock, oilstones, granite, limestone, slate, and building clay. Mineral waters are bottled at eight springs, and the yearly value of the product is in excess of $100,000.

**Forest and Forest Products.** About three-fourths of the area of Arkansas is estimated to be still covered with forests, which are made up of about 125 species of trees. The bulk of the forest consists of two species of pine (on uplands), one of cypress (in the southeastern lowlands), several of oak and hickory, and the red or sweet gum, tupelo gum (in swamps), cottonwood (along rivers), yellow poplar ("tulip trees"), ash, maple, and elm. The hard woods predominate in most parts of the State, but most of the lumber cut at present is pine, because that is easier to handle in almost every way.

The thirteenth census reports 2060 saw mills in the State, with the following production of lumber, laths, and shingles for the year 1909: Pine, 1,313,668,000 feet; oak, 358,556,000; red gum, 200,953,000; cypress, 55,012,000; cottonwood, 55,507,000; hickory, 45,133,000; ash, 33,212,000; maple, 18,500,000; elm, 13,056,000; tupelo, 6,084,000; sycamore, 5,406,000; poplar, 4,484,000; all others, 2,729,000. Total, 2,111,300,000 feet, valued at $31,839,283, which is about 4½ per cent of the total lumber production of the United States.

These figures do not include fuel, cross-ties, poles, posts, staves, veneers, etc., which of course are turned out in large quantities, or whole logs shipped to St. Louis, Memphis, New Orleans, etc. About 75 per cent of the pine lumber and 40 per cent of that from deciduous trees was dressed or still further manufactured within the State.

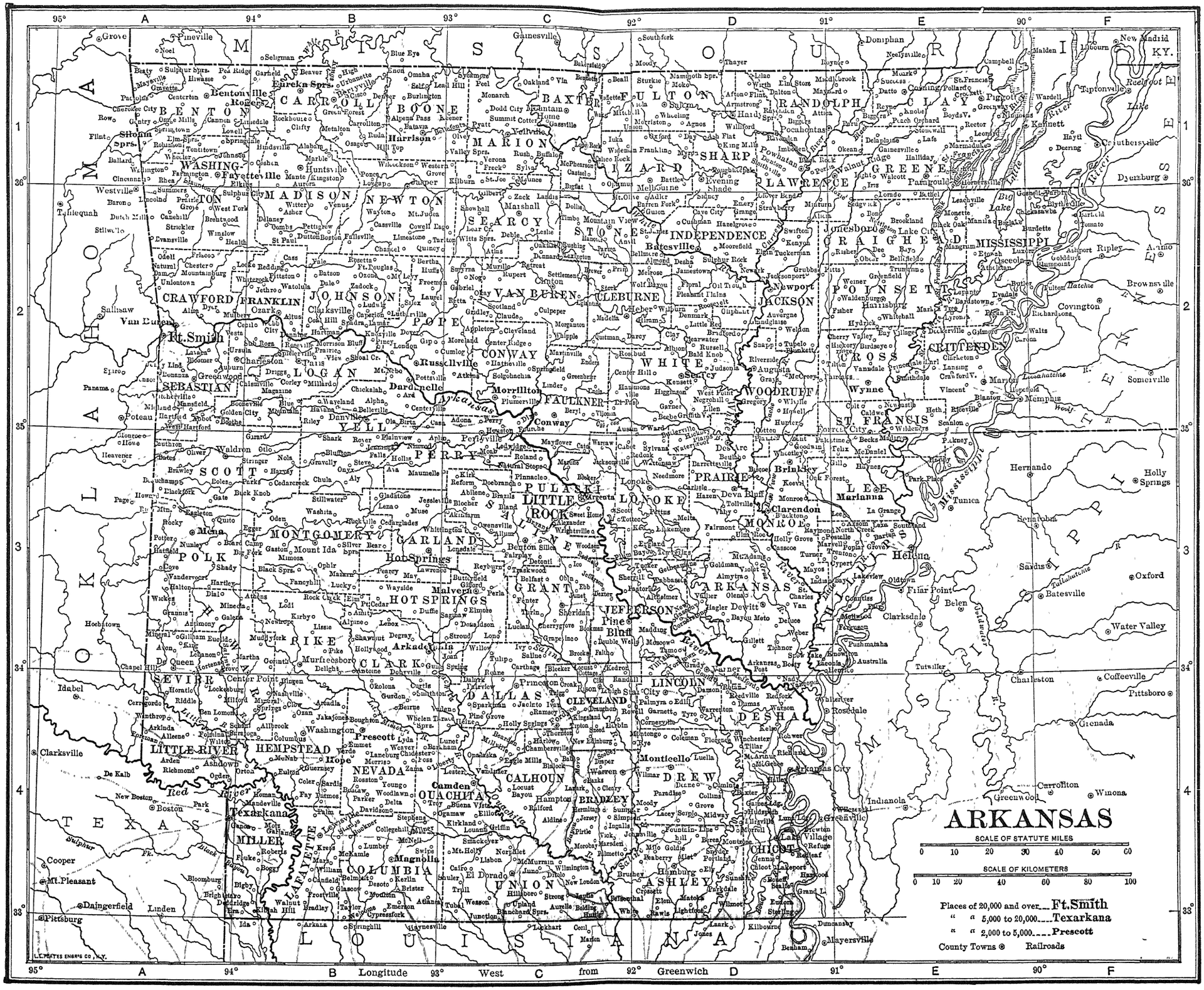
**Agriculture.** Arkansas is one of the most distinctively agricultural States in the Union. Its soils are varied and are adapted to many forms of cultivation. Rainfall over the whole of the State is ample for all ordinary crops. The State is divided naturally into two agricultural sections. A line drawn through Little Rock from the northeastern to the southwestern point of the State would divide it about equally into a southeastern lowland division and a northwestern highland division. The Mississippi River and its principal tributaries are bordered by broad alluvial bottoms of low elevation and nearly level surface, above which rise the more rolling and elevated parts of the Coastal Plain. Within the Coastal Plain division are several flat interstream prairies and more rolling forested uplands. The valley of the Arkansas River lies in the northern and west central parts of the State.

The total number of farms in 1910 was 214,678, compared with 178,694 in 1900, or a gain of over 20 per cent. Out of the land area of 33,668,000 acres, 17,416,075 were in farms in 1910. The improved land in farms was 8,076,254, compared with 6,953,735 in 1900. The average number of acres per farm was 81.1 in 1910, compared with 93.1 in 1900. In 1910 the land, buildings, and live stock were valued at $400,089,303, while in 1900 they had the value of $181,416,001, a gain of 120.5 per cent. The average value of all property per farm in 1910 was $1864, compared with $1015 in 1900, while the average land was valued at $14.38 per acre in 1910, and $6.32 in 1900. Of the total number of farms, 214,678 in 1910, 107,412 were operated by owners and managers, and 107,266 by tenants. While the total number of farm operators increased 127.3 in the decade 1900–10, the number of tenants increased 267.5. Of 106,649 owned farms in 1910, 82,321 were free from mortgage, 22,374 were under mortgage. The native white farmers in 1900 numbered 148,627. There were 2458 foreign-born whites and 63,593 non-white farmers. Of the non-white farmers, nearly all were negroes, only 15 being Indians.

The most important agricultural product of Arkansas is cotton. In 1909 the acreage devoted to cotton was 26.7 per cent of the entire improved farm land in the State, and the value of the cotton crop was more than half the combined value of all other crops. Acreage value and production of the principal crops in 1909 and in 1912 are shown in the following table:

| | | Acreage | Production bushels | Value |
|---|---|---|---|---|
| Corn | 1912 | 2,475,000 | 50,490,000 | $33,828,000 |
| | 1909 | 2,277,116 | 37,609,544 | 27,910,044 |
| Wheat | 1912 | 94,000 | 940,000 | 884,000 |
| | 1909 | 60,426 | 526,414 | 532,712 |
| Oats | 1912 | 175,000 | 3,482,000 | 1,741,000 |
| | 1909 | 197,449 | 3,212,891 | 1,641,752 |
| Rye | 1912 | 1,000 | 10,000 | 10,000 |
| | 1909 | 1,080 | 7,354 | 6,834 |
| Rice | 1912 | 90,800 | 3,405,000 | 3,201,000 |
| | 1909 | 27,419 | 1,282,830 | 1,158,103 |
| Potatoes | 1912 | 25,000 | 1,750,000 | 1,610,000 |
| | 1909 | | | |
| Hay | 1912 | 286,000 | 352,000* | 4,224,000 |
| | 1909 | 435,915 | 461,817 | 4,487,139 |
| Tobacco | 1912 | 800 | 520,000† | 94,000 |
| | 1909 | 758 | 316,418 | 40,489 |
| Cotton | 1912 | 1,191,000 | 1,021,000‡ | 55,246,000 |
| | 1909 | 2,153,222 | 776,879 | 54,559,503 |

* Tons. † Pounds ‡ Bales of 500 pounds each.


ARKANSAS
SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 40 60 80 100
Places of 20,000 and over.... Ft. Smith
" " 5,000 to 20,000.... Texarkana
" " 2,000 to 5,000.... Prescott
County Towns ⊙ Railroads
L.E. YATES ENGR'G CO., N.Y.
Longitude West from Greenwich
MISSOURI
OKLAHOMA
TEXAS
LOUISIANA
MISSISSIPPI
TENNESSEE
KY.
Arkansas River
Red River
Mississippi River
White River
St. Francis River
Ouachita River
Saline River
Little Red River
Black River
Cache River
Current River
Eleven Point River
Spring River
Strawberry River
Big Creek
Big Lake
Reelfoot Lake
Lake Chicot
Bayou Bartholomew
Bayou Meto
Bayou De View
Bayou Des Arc
Bayou Two Prairie
Bayou Cypress
Bayou Deview
Bayou Bodcau
Bayou Dorcheat
Bayou Macon
Bayou Tensas
Bayou Boeuf
Bayou Lafourche
Bayou Terre Noire
Bayou Barbary
Bayou Grand Glaise
Bayou Bonne Idee
Bayou Cornie
Bayou Fourche
Bayou Fourche La Fave
Bayou Fourche Des Peres
Bayou Fourche Des Prairies
Bayou Fourche Des Petites Prairies
Bayou Fourche Des Petites Prairies
Bayou Fourche Des Petites

The acreage devoted to cotton, cereal crops, and potatoes has shown a steady increase from 1879 to 1909. Orchard and small fruits are of considerable importance, value of the former in 1909 being $3,011,377. Of these peaches and nectarines were the most important and were valued at $1,502,996. The value of the apples produced in that year was $1,322,785. Other orchard fruits grown are plums, pears, cherries, and apricots. Of small fruits, strawberries are by far the most important, and the value of this fruit in 1909 was $549,041. The raising of flowers and plants and of nursery products is also of some importance. In 1909, 554 acres were devoted to these products, and the output was valued at $352,000. Sugar beets are grown on a small scale. In 1909 they were valued at $3945. Sorghum cane and sugar cane are grown in considerable quantities. The value of sorghum cane in 1909 was $658,075; of sugar cane, $152,298.

farms reporting irrigation for rice growing in 1910. According to reports of the United States Department of Agriculture, the acreage in 1912 was 90,800, the product being 4,405,000 bushels and the value $3,201,000.

**Manufactures.** The industries of Arkansas have shown marked increase in recent years. While in 1849, 261 manufacturing establishments then reporting gave employment to an average of 842 wage-earners, representing .4 of one per cent of the total population of the State, in 1909 an average of 44,982 wage-earners were employed, representing 2.9 per cent of the total population. During this period of sixty years, the gross value of products per capita of the entire population increased from $2.56 to $47.58. The following table gives a comparative summary of 1909 and 1904 of the most important facts relating to the manufactures valued at $1,000,000 or over:—

COMPARATIVE SUMMARY FOR 1909 AND 1904

| INDUSTRY | Census | Number of establishments | PERSONS ENGAGED IN INDUSTRY | | | | Capital | Salaries | Wages | Value of products |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Proprietors and firm members | Salaried employees | Wage-earners (average number) | Expressed in thousands | | | |
| State — All industries | 1909 | 2,925 | 51,730 | 3,455 | 3,293 | 44,982 | $70,174 | $3,461 | $19,113 | $74,916 |
| | 1904 | 1,907 | 37,557 | 2,140 | 2,328 | 33,089 | 46,306 | 2,310 | 14,544 | 53,864 |
| Bread and other bakery products | 1909 | 133 | 491 | 161 | 20 | 310 | 421 | 12 | 161 | 1,177 |
| | 1904 | 63 | 257 | 68 | 18 | 171 | 180 | 18 | 85 | .... |
| Carriages and wagons and materials | 1909 | 58 | 1,126 | 63 | 90 | 973 | 1,823 | 92 | 405 | 1,664 |
| | 1904 | 33 | 541 | 31 | 50 | 460 | 747 | 39 | 174 | .... |
| Cars and general shop construction and repairs by steam railroad companies | 1909 | 16 | 3,464 | .... | 215 | 3,249 | 1,561 | 261 | 2,061 | 4,154 |
| | 1904 | 13 | 2,643 | ... | 135 | 2,508 | 561 | 152 | 1,545 | 3,078 |
| Flour-mill and grist-mill products | 1909 | 113 | 549 | 133 | 104 | 312 | 1,599 | 97 | 122 | 5,615 |
| | 1904 | 91 | 434 | 11 | 55 | 263 | 1,353 | 45 | 104 | 3,702 |
| Foundry and machine-shop products | 1909 | 42 | 563 | 42 | 74 | 447 | 1,418 | 90 | 304 | 1,051 |
| | 1904 | 33 | 418 | 27 | 28 | 363 | 762 | 31 | 200 | .... |
| Lumber and timber products | 1909 | 1,697 | 36,662 | 2,135 | 1,595 | 32,932 | 42,346 | 1,793 | 13,060 | 40,640 |
| | 1904 | 929 | 26,348 | 1,079 | 1,360 | 23,909 | 29,619 | 1,415 | 10,265 | 31,993 |
| Oil, cottonseed, and cake | 1909 | 44 | 1,350 | 3 | 261 | 1,086 | 5,239 | 281 | 441 | 7,789 |
| | 1904 | 42 | 1,135 | 3 | 210 | 922 | 4,106 | 197 | 329 | 4,940 |
| Printing and publishing | 1909 | 295 | 1,672 | 417 | 274 | 981 | 1,910 | 212 | 538 | 2,082 |
| | 1904 | 277 | 1,360 | 361 | 104 | 895 | 1,315 | 93 | 438 | 1,443 |

According to the thirteenth census the total value of live stock on farms in the State was $71,794,486 in 1910. Of this, cattle numbered 1,028,071, valued at $15,460,666; horses, 254,716, valued at $23,152,209; mules, 222,200, valued at $5,170,924; sheep, 144,189, valued at $327,984. The United States Department of Agriculture reports for Jan. 1, 1913, 270,000 horses, 233,000 mules, 892,000 cattle, 130,000 sheep, and 1,529,000 swine. The total value of poultry on farms in 1910 was $2,063,432.

**Irrigation.** Irrigation has made rice culture an important activity in the State since 1900. The rice growers almost universally provide their own water supply, only one enterprise furnishing water under contract in 1909. The total acreage irrigated for rice growing in 1909 was 27,753. The quantity raised in 1910 was 1,282,830 bushels, valued at $1,158,103. There were 232

This table shows that the manufacture of lumber and timber products is by far the most important. The total number of wage-earners engaged in manufacturing industries in 1909 was 44,982. Of this number, all but 750 were males. Wage-earners under 16 years of age numbered 525, and of these 469 were males. There are only five cities in the State which are important as manufacturing centres. These are Little Rock, Argenta (a suburb of Little Rock), Fort Smith, Pine Bluff, and Hot Springs. There were in 1909 2157 wage-earners in Argenta, 2017 in Little Rock, 1455 in Fort Smith, 1118 in Pine Bluff, and 335 in Hot Springs. The value of the product of the manufactures of Little Rock, the leading manufacturing city, in 1909 was $6,881,662.

**Transportation and Commerce.** The chief waterway is the Mississippi River, which gives an outlet to the Atlantic Ocean and water

communication with other States of the Mississippi valley. In addition to this there are many smaller streams which afford navigable waterways. Railroad facilities are good, except in the mountainous regions of the north central and west central sections. The railroad mileage on Jan. 1, 1913, was 6162.26 miles, compared with 4357 miles in 1906. There were, in 1913, 95.15 miles of electric railways in the State. The State Railroad Commission has general charge of fixing rates. Railways and other public service corporations are assessed for their franchises as well as for their property. An act passed by the Legislature of 1911 regulates the liability of common carriers for injuries to their employees. Contributory negligence does not bar recovery if the employer's disregard of the law has contributed to the injury. A law provides full train crews. Foreign commerce, much of which passes through New Orleans, consists chiefly of cotton and lumber.

**Banks.** The total number of banks in Arkansas in 1912 was 376, and their deposits totaled $48,856,407. National banks numbered 49 with deposits of $16,464,452; savings banks 5, with deposits of $331,063; and State banks 310, with deposits of $25,266,613.

**Finance.** Receipts of the treasury for the fiscal year 1911–12 were $6,899,247, and the expenditures $6,734,915. The balance on hand at the close of the fiscal year was $800,880. The State debt in 1913 was $1,250,500 in 3 per cent 30-year bonds to mature in 1929. These bonds are held by the permanent school fund and by the University of Arkansas endowment funds. The chief source of revenue is a direct tax on all property.

**Education.** Arkansas, like other southern States, labors under difficulties disadvantageous to the improvement of educational conditions. However, it has shown in recent years commendable zeal in attempting to better the situation. In 1907 the tax laws were amended allowing for an increase of the school tax from 1 to 3 mills on the dollar. A compulsory education law became effective the beginning of the school year 1909–10, and the Legislature of 1909 passed measures providing for the consolidation of school districts and made provision for four agricultural schools.

The thirteenth census showed 142,954 illiterates, a percentage of 12.6 per cent of the entire population. In 1900 the percentage was 20.4. The percentage of white illiterates of native parentage in 1910 was 7.1; of foreign or mixed parentage 2.8, and of negroes 26.4. The percentage of illiteracy among negroes in 1900 was 43. The school population of persons from 6 to 20 years was 551,672. Of these 324,035, or 58.7 per cent, were in attendance in school. Statistics of the State Department of Education showed a school population on June 30, 1913, of 617,265. Of these 435,575 were white, and 181,790 colored. There were enrolled in 1912 in the public schools 409,756 children, of whom 300,015 were white and 109,731 were colored. Average daily attendance was 261,747. Teachers employed numbered 10,175, and of these 8227 were white and 1948 were colored. Expenditures for the maintenance of schools in 1913 were $4,279,478. There were 93 State high schools in 1911–12, and 60 unaided high schools. In 1912 school property was valued at approximately $10,000,000, while in 1900 its value was only $2,500,000. The Legislature of 1911 provided liberal appropriations for the maintenance of the State University, State normal school, the four agricultural schools, and the deaf, mute, and blind schools. This Legislature passed a provision making the Medical Department of Arkansas Industrial University a part of the State University. A constitutional amendment providing for uniform text-books was defeated at the election held in September, 1912, by a small majority. A commission of 20, appointed by the Governor, with the State Superintendent of Public Instruction as chairman, carries on work with funds provided by the Southern Educational Board. The first report of this commission was made in 1911. In 1912–13 an educational building was erected at the State University; for this the Peabody Board gave $40,000. The four district agricultural schools referred to above, which were opened in 1912, are at Jonesboro, Russellville, Magnolia, and Monticello. Universities in the State include the University of Arkansas, at Fayetteville; Philander Smith College, at Little Rock, Ouachita College and Henderson College, at Arkadelphia, and Hendrix and Central Baptist College, at Conway.

**Charitable and Penal Institutions.** These include a lunatic asylum, schools for the blind, the deaf and mute institute, and a State penitentiary, all located at Little Rock. The Legislature of 1911 provided for juvenile courts in the counties of the State, and the Legislature of 1909 made provision for tuberculosis sanitariums. Convicts are leased to contractors, and the system has led to abuses similar to those which have marked its use in other States. Governor Donaghey recommended to the special session called in 1911 the adoption of provisions for the proper management and control of the State Penitentiary and the abolition of the convict labor system. These recommendations were disregarded, and on December 16 the Governor paroled 360 State convicts. As the result of this action, three county convict camps in which convicts were leased to contractors were wiped out of existence. Governor Donaghey claimed that his fight against this system received little or no support in the Legislature. He recommended that the Legislature of 1913 abolish the system.

**Religion.** As is common in the southern States, the Baptist and Methodist churches contain the bulk of the church membership. Of the other churches represented, the Presbyterian and the Christian are the only ones that have obtained any considerable following.

**Population.** The population of the State by decades is as follows: 1820, 14,273; 1830, 30,388; 1840, 97,574; 1850, 209,897; 1860, 435,450; 1870, 484,471; 1880, 802,525; 1890, 1,128,179; 1900, 1,311,564; 1910, 1,574,449; 1920, 1,752,204. The density of population in 1910 was 30 per square mile, compared with 24.7 in 1900. Of the total population in 1910, 1,131,026 were white and 442,891 colored, of 71.8 per cent white and 28.1 per cent colored. In 14 of the 75 counties of the State, more than half the population were negroes, but in 26 counties negroes form less than five per cent of the total. Negroes are most numerous in the southwest. The native whites of native parentage constitute 68.4 of the total population, and 95.3 of the white population. The native whites of foreign or mixed parentage constitute only 2.3 per cent of the total population, and foreign-born whites 1.1 per cent. Arkansas is

notable for the large percentage of its rural population. In 1910 the 28 incorporated places having each 2500 or more inhabitants contained only 12.9 per cent of the total population. The strictly rural population, not in cities and towns, however, decreased from 82.9 per cent in 1900 to 76.1 in 1910. Males of voting age in 1910 numbered 395,824, compared with 313,836 in 1900. The total number of foreign-born whites, which represents the number added by immigration, was, in 1910, 53,517. Of these, only 16,909 were foreign born. The largest percentage of immigrants came from Germany. The largest cities in 1910 were Little Rock, the capital, 45,941; Fort Smith, 23,975; Pine Bluff, 15,102; Hot Springs, 14,434; Argenta, 11,138; Helena, 8772; Jonesboro, 7123; Texarkana, 5655, and Paragould, 5248. For further details on these towns see separate articles under each.

**Government.** The present constitution, which is the third for the State, was adopted by a vote of the people in 1874. Either house may propose an amendment to the constitution, which, if approved by a majority of both houses and by a majority of the voters at the next general election, is adopted. To enjoy the right of suffrage one must have resided in the State one year, in the county six months, and in the precinct or ward one month, while an amendment passed in 1893 further restricts the suffrage to those who have paid a poll tax. State elections are held every two years, on the second Monday in September. Some further provisions of the constitution are: "No person who denies the being of a God shall hold any office in the civil departments of this State, nor be competent to testify as a witness in any court." Six per cent is the legal rate of interest; all contracts for a greater rate than 10 per cent are void. Arkansas has nine electoral votes.

As will be noted in the paragraphs on *History* below, a constitutional amendment providing for the initiative and referendum was carried by vote of the people in 1910. The Legislature of 1911 formulated laws to carry this amendment into effect. In the main, these measures are similar to those enacted in other States. Five per cent of the legal voters of the State may, 90 days after the adjournment of the Legislature, by petition, order a referendum upon any law of general character passed by the Legislature; and five per cent of the voters in the cities and towns may order, by similar petition, a referendum on measures perfecting these municipalities. A majority of the votes cast in such referendum makes a law effective.

Eight per cent of the legal voters may, at any time more than four months before the regular session of the Legislature, propose any amendment to the constitution or measure of general legislation, except measures pertaining to the regulation of liquor. If such laws or amendments receive a majority of the legal votes cast, they become laws or amendments of the State.

*Legislative.*—The representatives to the State Legislature are elected for a term of two years, and cannot exceed 100 in number, each county being entitled to one member, while the extra members are distributed among the more populous counties. Thirty and 35 are respectively the minimum and maximum limits to the number of Senators, who are elected from districts of contiguous counties for four years. Legislative sessions are limited to 60 days, unless extended by a two-thirds vote of each house.

*Executive.*—The Governor, Secretary of State, Treasurer, Auditor, and Attorney-General are each elected for a term of two years. The salary of the Governor is $4000 per annum. His veto may be overridden by a majority vote of each house. If the office of Governor becomes vacant 12 months before the expiration of the term, a new election is held to fill the vacancy—if the vacancy occurs within that period, the President of the Senate completes the term.

*Judiciary.*—There is a supreme court of five members, each elected for eight years; a number of circuit courts, each member of which is elected for four years; a probate and county court for each county; and at least two justices of the peace for each township, the justices of the peace and county judges being elected for terms of two years. The General Assembly also vests such jurisdiction as may be deemed necessary in municipal corporation courts, courts of common pleas, where established, and when deemed expedient, and establishes separate courts of chancery.

*Elections.*—The Legislature of 1909 passed an act regulating primary elections of the State. This law legalized all primaries, held for State or national offices. The law makes it a misdemeanor to solicit gifts for candidates and provides that the latter must file itemized accounts of the expenses and expenditures during the campaign.

*Local Government.*—Each county has a sheriff, assessor, coroner, treasurer, and surveyor, each elected for two years. Each township has a constable, who is elected for two years. The Legislature may create other local offices. The county court, together with a majority of the justices of the peace, levies road taxes when the people have voted in favor of such a measure. The Legislature provides, by general laws, for the organization of cities (which may be classified) and incorporated towns and can place certain restrictions upon them.

*Militia.*—The total number of males of militia age in the State in 1910, according to the thirteenth census, was 311,792. According to the report of the Adjutant-General in 1912, there were in that year 326,565 males available for military duty. The organized militia is composed of two regiments of infantry, of 12 companies each. These are combined into a brigade called the First Brigade. The total number of enlisted men in these regiments in 1912 was 1328 with 139 officers. The designation of the organized militia is the Arkansas National Guard.

**History.** The name "Arkansas" was that of an Indian tribe found by the first explorers within the limits of the present State. About 1685 Frenchmen settled at Arkansas Post. Arkansas formed a part of Louisiana Territory till 1812, and of Missouri Territory till 1819, when it was organized as Arkansas Territory, including the land within the boundaries of what was formerly Indian Territory. On June 15, 1836, it became a State. Though settled chiefly from the South, it was fairly divided between Unionists and Secessionists in the early part of 1861; but President Lincoln's call for troops led to the passing of an ordinance of secession on May 6, 1861. The Confederates were defeated at Pea Ridge, March 7–8, 1862, and at Prairie Grove, December 7. Helena was occupied by Union forces, and Arkansas Post was captured on Jan. 11, 1863. With the fall of Little Rock, Sept. 10, 1863, the Confederate power in the State collapsed. In October and November Union delegates from

20 counties met at Fort Smith to take steps to reorganize the State government, and in January, 1864, a convention met at Little Rock and framed a constitution, which was accepted by the people, but rejected by Congress. Under the Reconstruction Act of 1867, a constitutional convention met, Jan. 7, 1868, at Little Rock, and framed a constitution, which was ratified March 13, by a small majority. On June 22 the State was readmitted to the Union. In April, 1874, an armed collision occurred between the adherents of two rival claimants for the governorship. Federal aid was invoked, and President Grant formally recognized Baxter, Republican, as the lawful Governor. In 1874 a new constitution was adopted. It marked a radical change in the existing law and was in the main a return to ante-bellum conditions. The prosperity of the State has increased with the development of its rich mineral resources.

The Legislature of 1907 passed a number of severe laws aimed at the regulation and control of railways passing through the State. Their attempted enforcement brought the authorities into conflict with the Federal government. (See STATE RIGHTS.) In the election of Nov. 3, 1908, Bryan received 87,015 votes; Taft, 56,624. George W. Donaghey, Democrat, was elected Governor, receiving 111,478 votes, to 45,400 cast for the Republican candidate. The Legislature of 1909 voted to submit to the people amendments to the constitution providing for the initiative and referendum, and for the exemption from taxation for a period of years of capital invested in cotton manufacture. Election on the amendments was held in September, 1910. The amendment providing for the initiative and referendum was carried by a majority of 52,303 votes. The amendment relating to cotton manufacture failed. At this election Governor Donaghey was reelected for a second term. At the session of 1911 the Legislature made a provision for a vote on an amendment to the constitution carrying into effect the so-called "Grandfather Clause," for the purpose of eliminating the negro vote. At a special session held in the same year measures were passed carrying into effect the initiative and referendum law, adopted in 1910. The State campaign in 1912 was on the issue of State-wide prohibition of the sale of intoxicating liquors. Governor Donaghey, who was a candidate at the primaries for renomination, favored prohibition, while his opponent for the nomination, Joseph T. Robinson, favored local option. Governor Donaghey was defeated, and Mr. Robinson became therefore the Democratic candidate for Governor. At the State election held on Sept. 9, 1912, four acts and five amendments to the constitution were voted upon. The acts provided for the reduction of rate of taxation, for State-wide prohibition, for amendments to the election laws of the State, and for the creation of a text-book commission. The amendments provided for the "Grandfather Clause" referred to above, the amendment previously adopted providing for the exemption from taxation of capital invested in cotton mills and for the recall of State officers. Other amendments provided for the changes in the State laws for taxation. Of these nine acts and amendments, only the amendment providing for the limitation of the pay of legislators for 60 days was accepted. The amendment providing for the recall of State officers received a majority of the votes cast, but not a majority of the votes of the candidate who received the highest vote. The courts therefore ruled that this amendment was not adopted, and furthermore that it was illegally proposed, having been the fifth amendment submitted, whereas by law only three amendments may be submitted at a time. At this election Joseph T. Robinson was elected Governor, receiving 109,826 votes, against 46,240 votes cast for his Republican opponent. The Progressive party had no candidate for Governor. The vote for President in the election held on Nov. 5, 1912, was, for Wilson, 67,838; for Taft, 24,297; for Roosevelt, 22,673. The death of Senator Jeff Davis on Jan. 3, 1913, made it necessary for the Legislature to choose his successor. Governor Robinson, inaugurated on January 14, was elected Senator on January 29. On March 8 he resigned and was succeeded by W. K. Oldham, President of the Senate, who served until March 23, and was succeeded by J. M. Futrell, who had been elected President of the Senate to succeed him. George W. Hays was elected Governor in July, and took office August 6.

Since 1876 the Democrats have been victorious in State and national elections. The electoral vote has been cast as follows: in 1836 and 1840, for Van Buren and Johnson, 3; 1844, Polk and Dallas, 3; 1848, Cass and Butler, 3; 1852, Pierce and King, 4; 1856, Buchanan and Breckenridge, 4; 1860, Breckenridge and Lane, 4; 1864, no vote; 1868, Grant and Colfax, 5; 1872, 6 votes not counted; 1876, Tilden and Hendricks, 6; 1880, Hancock and English, 6; 1884, Cleveland and Hendricks, 7; 1888, Cleveland and Thurman, 7; 1892, Cleveland and Stevenson, 8; 1896, Bryan and Sewall, 8; 1900, Bryan and Stevenson, 9; 1904, Parker and Davis, 9; 1908, Bryan and Kern, 9; 1912, Wilson and Marshall, 9.

The following is a list of the Governors:

TERRITORIAL

| | |
|---|---|
| James Miller | 1819–25 |
| George Izard | 1825–29 |
| John Pope | 1829–35 |
| William S. Fulton | 1835–36 |

STATE

| | | |
|---|---|---|
| James S. Conway | Democrat | 1836–40 |
| Archibald Yell | " | 1840–44 |
| Samuel Adams | " | 1844 |
| Thomas S. Drew | " | 1844–48 |
| John S. Roane | " | 1848–52 |
| Elias N. Conway | " | 1852–60 |
| Henry M. Rector | " | 1860–62 |
| Harris Flanagan | " | 1862–64 |
| Isaac Murphy | Republican | 1864–68 |
| Powell Clayton | " | 1868–71 |
| Ozro A. Hadley | " | 1871–72 |
| Elisha Baxter | " | 1872–74 |
| Augustus H. Garland | Democrat | 1874–77 |
| Wm. R. Miller | " | 1877–81 |
| Thomas J. Churchill | " | 1881–83 |
| James H. Berry | " | 1883–85 |
| Simon P. Hughes | " | 1885–89 |
| James P. Eagle | " | 1889–93 |
| William M. Fishback | " | 1893–95 |
| James P. Clarke | " | 1895–97 |
| Daniel W. Jones | " | 1897–01 |
| Jeff Davis | " | 1901–07 |
| John S. Little | " | 1907–09 |
| George W. Donaghey | " | 1909–13 |
| Joseph T. Robinson | " | 1913 |
| W. K. Oldham | " | Mar. 8–23 |
| J. M. Futrell | " | Mar. 23–Aug. 6 |
| George W. Hays | " | 1913–17 |
| C. H. Brough | " | 1917–21 |
| Thomas C. McRae | " | 1921– |

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**ARKANSAS,** UNIVERSITY OF. A State institution at Fayetteville, Ark., founded in 1871. It has a medical and a law school at Little Rock and a branch normal college for negroes at Pine Bluff. The main divisions of the university, situated at Fayetteville, comprise a College of Liberal Arts and Sciences, a College of Engineering, a College of Agriculture, a Department of Education, and an Agricultural Experiment Station. These divisions are supported by the aid of Federal and State endowments and appropriation and have an income of about $240,000; grounds, buildings, and equipments valued at more than $1,000,000; and a library of about 35,000 volumes. In 1913 there were 80 professors and instructors and 800 students in the divisions at Fayetteville. The Medical School at Little Rock receives from the State an annual appropriation of about $20,000 in addition to the fees paid by students. The Law School has only a nominal connection with the university and is entirely supported by students' fees. The Branch Normal College at Pine Bluff receives support from both the Federal and State governments. Tuition is free in all the divisions of the university except in the professional schools. Acting president, John C. Futrall, M.A.

**ARKANSAS CITY.** A city in Cowley Co., Kan., 51 miles south by east of Wichita, on the Atchison, Topeka, and Santa Fe, the Missouri Pacific, the Kansas Southwestern, the Midland Valley, and the St. Louis and San Francisco railroads (Map: Kansas, E 8). The principal features of interest are the United States Indian School, a Manual Training College, a Carnegie library, a high school, an opera house, two parks, and several bridges. The city is near the confluence of the Arkansas and Walnut rivers, which are connected by a canal that furnishes water power for manufacturing. It is the centre of a highly productive agricultural and stock-raising country; manufactures flour, lumber, windmills, mattresses, ice, yeast, carriages, and creamery products; contains railroad repair shops and planing mills; and from its location near the southern boundary of Kansas, has an important trade with the Indian agencies and military posts in Oklahoma. It is the centre of the new Western oil fields. Settled in 1870, Arkansas City was incorporated the following year, and in 1912 adopted the commission form of government. The water works are owned and operated by the municipality. Pop., 1890, 8347; 1900, 6140; 1910, 7518; 1920, 11,253.

**ARKANSAS RIVER.** Next to the Missouri, the largest affluent of the Mississippi River (Map: United States, Eastern Part, G 3). It rises in central Colorado, flows east into Kansas, and out again east of the middle of the south boundary of the same State, southeast across Oklahoma and diagonally across Arkansas, bisecting it into nearly equal parts and emptying into the Mississippi. The river is about 2000 miles long, navigable for small steamboats to Wichita, Kan., 650 miles, and drains an area of 188,000 square miles. Much of the water in its upper course is used for irrigation purposes. In Fremont County, central Colorado, it flows through the Royal Gorge, one of the deepest cañons in the United States. In its upper course the current is very rapid, but in its lower portion it is slow, and the tortuous river bed is sandy and broad. It receives the Salt Fork, Cimarron, and the Canadian from the west in Oklahoma, and the Verdigris and Grand rivers from the north.

**ARKANSAS STONE.** See NOVACULITE.

**ARKANSAS TRAVELER,** THE, är'kan-sa. A comic dialogue or rustic drama, with musical accompaniment, in which the two parts represented are an Arkansas squatter (a fiddler) and the Arkansas Traveler. It was a great favorite in the taverns and hotels of the West and Middle West when there were but few railroads. The person who took the part of the squatter was usually seated on a broken-backed chair or a box on the table in the centre of the room, where he attempted to play on a violin the first part of the tune "The Arkansas Traveler," which he was supposed to have heard at a theatre in New Orleans. During the attempt, which was unsuccessful, he was subjected to a running fire of teasing questions by a person who approached him, and who proved to be the Traveler himself. The latter, after more dialogue, took the violin and played the second part, but refused to play the first. Consult *Ohio Archæological and Historical Society Publications*, vol. viii, pp. 296–307 (Columbus, 1900).

**ARKLOW.** A small seaport town of county Wicklow, Ireland, about 50 miles south of Dublin (Map: Ireland, E 4). Powder is manufactured, and fishing is carried on to a large extent. Lead and copper are exported. Near the town is Shelton Abbey, the seat of the Earl of Wicklow. In the uprising of 1798 the Irish were defeated here by the British. Pop., 1891, 4172; 1901, 4944; 1911, 5042.

**ARK OF THE COVENANT,** ARK OF THE TESTIMONY, ARK OF YAHWE, or ARK OF GOD. According to the data furnished in the Bible, this was one of the most important parts of the furniture of the tabernacle constructed in the Wilderness, and afterward of the temple built by Solomon at Jerusalem. We have two descriptions of it in the Pentateuch, Ex. xxv. 10–22 and xxvii. 1–9.

From these descriptions it appears that the ark was a chest of shittim-wood (very generally supposed to be the wood of a species of acacia, but by some regarded as that of the wild olive), overlaid with gold within and without, two cubits and a half in length, one cubit and a half in breadth and in height, with a crown or raised border of gold round about. Within the ark was deposited the "testimony," consisting of "the two tables of the Law"—i.e., the stone tablets upon which the Ten Commandments were inscribed (Ex. xl. 20). The golden lid of the ark was called the *mercy-seat* or *propitiatory;* above it were the *cherubim* (see CHERUB),

made of the same piece of gold with it, and between them the place of the *Shechinah*, or manifestation of the Divine Presence. It should, however, be mentioned that neither in Deuteronomy nor in the Books of Kings are these figures of the cherubim mentioned. The ark had golden rings, through which passed staves of shittim-wood, overlaid with gold, for carrying it in the journeyings of the Israelites, concerning which very particular rules were laid down (Num. iv.). While being carried from one place to another, it was covered first with a "covering of badgers' skins," and above this with a "cloth wholly of blue"; and when reposing in the tabernacle and temple it was put into the "most holy place," into which the high priest alone was to enter upon the Day of Atonement. After the tabernacle had been set up at Shiloh, the ark was deposited there (Josh. xviii. 1). When Israel sustained defeat at the hands of the Philistines at Eben-ezer, they sent to Shiloh for the ark (1 Sam. iv. 3–5). In the battle which followed, the Philistines captured the ark; they carried it about to several places in their land, but in each place misfortune followed its arrival, and at the advice of their diviners the Philistines returned the ark to Israel at Beth-Shemesh, whence it was removed to Kirjath-Jearim (1 Sam. iv. 11–viii. 2); hence David removed it to Jerusalem (2 Sam. vi. 1), and Solomon assigned it a place in the temple (1 Kings viii. 6). What finally became of the ark is unknown; perhaps it was captured in Nebuchadnezzar's siege of Jerusalem. At any rate, there was no ark in the second temple (Josephus, *B. J.*, 5, 5). In Jer. iii. 16, 17, an oracle is preserved foretelling that in the prosperous time to come the ark shall not be remembered or thought of or made again, but Jerusalem is to be the throne of Yahwe. There apparently was a plan of building a new ark. According to 2 Maccabees ii. 1, Jeremiah hid the ark on Mount Nebo, and Syriac Baruch vi. 5–10 relates that during the siege of Jerusalem by the Chaldæans the temple mountain opened itself, at the command of an angel, and swallowed up the ark and other sacred vessels to be kept there until the time of the restoration.

It is not easy, from the various accounts of, and references to, the ark in the Old Testament to obtain a clear idea of what the ark actually was, or what was its age. Egyptians, Babylonians, and other ancient nations carried the images of their gods about in portable shrines, and arks containing sacred symbols were brought in solemn procession from one sanctuary to another or into the battle. The ark of Yahwe seems to have been regarded as his abode. Its cover was his throne. Hence his name: "Yahwe Zebaoth who sits upon the cherubs" (1 Sam. iv. 4). When the ark was brought with the army to the battle, it was said, "Rise, O Yahwe, thine enemies be scattered! Let those who hate thee flee before thy face!" After the battle the anxiety that his presence in the midst of his people should insure continued prosperity expressed itself in the cry, "To Israel's thousands, O Yahwe, return!" (Num. x. 35, 36). The account of the capture of the ark by the Philistines shows that where it rested, there Yahwe himself was supposed to have his abode for the time being. It should be borne in mind, however, that a stone, a chest, or a building may be thought of as the place where a divine being chooses by preference to dwell or to manifest himself without excluding on this account the idea that his power may be independent of it and extend far and wide beyond its boundary. In fact, the glory of Yahwe, sitting on this throne, suggests a celestial being whose home may also be said to be in heaven. Our account of the ark is supposed by some scholars to be a description of this ancient palladium as it appeared in the days of Solomon. As to the original contents of the ark, it has been assumed by some that it once consisted of a stone symbolizing the deity, but there is no evidence for this assumption. The name it had at the time when Deuteronomy was written (see PENTATEUCH) shows that it was then at least regarded as containing the tables of stone engraved with commandments. Consult: Dibelius, *Die Lade Jahves* (1906); Budde, "War die Lade Jahves ein leerer Thron?" in *Theologische Studien und Kritiken* (1906); Gressmann in *Die Religion in Geschichte und Gegenwart*, vol. ii (1910); Schmidt, *The Messages of the Poets*, pp. 321 ff. (1911).

**ARKO'NA.** The most northern point of the Wittow Peninsula, on the Prussian island of Rügen, in the Baltic (Map: Prussia, E 1). It rises about 145 feet above the sea, and has a lighthouse, erected in 1826.

**ARKOSE**, är-kōs'. See SANDSTONE.

**ARK SHELL,** or NOAH'S ARK. A marine bivalve mollusk, common along the eastern coast of the United States and representing the cosmopolitan family Arcadæ. The shells do not exceed 3 inches in length, are ventricose, hairy, and have the hinge margin long and perfectly straight. As the umbones are wide apart, this leaves a sort of flat "deck," which probably led Linnæus to the rather fanciful designation. They dwell near shore, especially where weedy rocks abound, but one species is known in the inland fresh waters of India. The commonest American species is *Arca pexata* (called "bloody clam," on account of its red gills and exudations), which is covered with coarse hairs. See Plate of ABALONE, ETC.

The genus *Arca* has existed for a great length of time, its ancestors being found in the rocks of all geological periods since the Ordovician, but in special abundance in the Tertiary deposits of all countries.

**ARK'WRIGHT,** SIR RICHARD (1732–92). Celebrated for his invention of cotton-spinning machinery, was born at Preston, in Lancashire, England. Of humble origin, the youngest of 13 children, and bred to the trade of a barber, his early opportunities of cultivation were exceedingly limited. In 1761 he gave up his business as a barber in Bolton, to become a traveling dealer in hair, and the profits of his trade were increased considerably by a secret process for dyeing hair which he had acquired. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture, and his mind was soon turned toward improved methods. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767 he seems to have given himself wholly up to inventions in cotton-spinning machinery. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair, which were in contact, revolving with a slow

motion, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. A subsequent operation was to spin the yarn from these threads. No previously invented machinery had been able to produce cotton thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Charles Wyatt of Birmingham, which was patented in 1738, but never succeeded, deprives Arkwright of the honor of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time Arkwright was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. Soon after, he removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Jedediah Strutt of Derby, the celebrated improver of the *stocking-frame*, who entered into partnership with him, in conjunction with his partner, Mr. Reed. In 1769 Arkwright set up his first mill, driven by horses, and took out a patent for his invention. In 1771 he set up a larger factory, with water power, at Cromford, in Derbyshire. Not only was his labor-saving machinery well arranged and ingeniously devised, but he effected such a division of labor and organization of his employees that the greatest efficiency of production was secured. From these mills of Arkwright the modern factory system takes its origin. He was one of the first to introduce the steam-engine into his factories, and the mill at Nottingham was supplied with a Boulton and Watts steam-engine of 1790. The remarkable capabilities of his mind were strikingly evinced in the management of the great business. In 1775 he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade his patent; and to such an extent did other cotton-spinners use his designs that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action against Colonel Mordaunt, backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that the description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and in the following year Arkwright published a pamphlet containing a statement of his case. In a new trial, in 1785, he obtained a favorable verdict. The whole question, however, was brought finally before the Court of King's Bench, a few months after, when Arkwright's claim to the inventions patented was for the first time called in question. On the doubtful evidence of a person named Highs, or Hayes, combined with that of Arkwright's old assistant, Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out Arkwright as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and Parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against the man who apparently displaced labor but in reality increased its sphere; and on one occasion a large factory belonging to Arkwright was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. The energy and good sense of Arkwright triumphed over all opposition, and at the time of his death, in 1792, the value of his property amounted to about $500,000. In 1786 he was appointed high sheriff of Derbyshire and was also knighted by George III. Consult Baines, *History of the Cotton Manufacture* (London, 1861), and Ure, *The Cotton Manufacture of Great Britain* (London, n d.). See SPINNING.

**ARLBERG,** ärl'bĕrk. A famous mountain pass between the Rhætian and the Lech Alps, connecting Tyrol with Vorarlberg (Map: Austria, B 3). It lies at an altitude of 5840 feet, along the watershed between the Danube and the Rhine. In 1786 a road was laid across the pass which in those times formed the only means of communication between Vorarlberg and the rest of Austria. The construction of the Arlberg Railway from Innsbruck to Bludenz, begun in 1880, necessitated the cutting of a tunnel through the pass. The tunnel, situated between St. Anton and Langen, with a length of 6.5 miles, completed the most direct route between Vienna and Paris. The highest point of the tunnel is 4260 feet, and the difference between the altitudes of the eastern and western ends is 280 feet. The tunnel was completed in 3½ years, at a cost of over $7,500,000, and was opened to traffic in September, 1884.

**ARLES,** *Fr. pron.* ärl; *Eng. pron.* ärlz (anciently, Lat. *Arelate*, or *Arelas*, from Celt. *Arlaeth*, on the marshy land). One of the oldest towns in France, in the department of Bouches-du-Rhône, situated on the left bank of the principal branch of the Rhône, after it has divided into a delta (Map: France, S., J 5). Although 27 miles from the mouth of the river, Arles carries on considerable trade. It has manufactures of silk, hats, flour, etc., and forms a market for the productions of the surrounding country. It possesses a college, a naval school, a public library, and several museums, one of which occupies the old church of St. Anne. The most interesting of these is located in the Tribunal de Commerce and was patronized by Mistral. A canal has been cut which connects Arles with the Mediterranean. Railways bring it into easy communication with Marseilles, Avignon, Nîmes, Montpellier, etc. Under the Romans it was the seat of a prefecture; afterward, for some time, the residence of the Gothic King Euric, and from 879 the metropolis of the kingdom of Arles, or of Cisjurane Burgundy (see BURGUNDY). This kingdom was united in 933 with that of Transjurane Burgundy, and this larger Arletan realm was ruled by native kings until 1032. On the extinction of this line the Arletan territories were taken possession of by the German Emperor Conrad II. In the early Christian times several important councils were convened here (in 314, 353, 452, and 475). At the famous council (synod) of 353 the cause of Arianism gained a temporary triumph. Among the antiquities of Arles are an amphitheatre (Les Arènes), which accommodated between 20,000 and 30,000 spectators; the ruins of a theatre; also of a palace of Constantine the Great; an obelisk of granite dug up from the mud of the Rhône in 1389; a burial-place (the Elysian

Fields) used by the Romans; and a Romanesque cathedral dedicated to St. Trophimus, the western portal of which is a unique example of Gallo-Byzantine art. Pop., 1896, 12,755; 1901, 15,506; 1906, 16,363; 1911, 16,746.

**ARLES,** THE KINGDOM OF. See BURGUNDY.

**ARLINCOURT,** ar'lăn'kōōr', CHARLES VICTOR PRÉVOT, VICOMTE D' (1789–1856). A French poet and novelist, born near Versailles. He commended himself to the favor of Napoleon by the publication of the flattering allegory *Une matinée de Charlemagne* (1810), for which he was rewarded with offices at court. Under Louis XVIII he was appointed *maître-des-requêtes*, but after the Hundred Days was obliged to resign. He wrote several novels, including *Le solitaire* (1821), *Le rénégat* (1822), and *L'étrangère* (1825), of which the first named was extensively read and many times translated. His tragedy *Le siège de Paris*, played at the Théâtre Français, in 1827, was greeted with outbursts of derisive laughter.

**ARLINGTON.** A residential town of Middlesex Co., Mass., on the Boston and Maine Railroad, 6 miles northwest of Boston. Market gardening, ice cutting, and the manufacture of piano cases, picture frames, and machines are leading industries (Map: Massachusetts, E 3). Arlington has a fine public library, a hospital, and its water supply is furnished under the metropolitan system. Town meetings are held in March and November and at special times on all matters of appropriation. Settled about 1650, Arlington was separated from Cambridge and incorporated as West Cambridge in 1807 and received its present name in 1867. Pop., 1900, 8603; 1910, 11,187; 1920, 18,665. Consult Cutter, *History of the Town of Arlington* (Boston, 1880) and Parker, *Town of Arlington, Past and Present* (Arlington, 1907).

**ARLINGTON.** A village in Alexandria Co., Va., opposite Washington, D. C. It was formerly the home of Robert E. Lee, but his property was seized by the government during the Civil War and is now the site of a national cemetery, in which some of the most prominent officers of the United States army are buried. The cemetery is one of the largest and most beautiful in the United States. There are 18,151 graves, 4608 of which contain unknown dead. The old Lee mansion, with its stately portico, is one of the finest specimens of Colonial architecture. Pop. (district), 1890, 2013; 1900, 3200; 1910, 5850.

**ARLINGTON,** HENRY BENNETT, EARL OF (1618–85). An English statesman of the period of Charles II. He was born at Arlington, studied at Oxford, and for a long period fought in the Civil War. He soon left England, however, for France, where he became in 1654 secretary of James Stuart. In 1658 he was sent to Madrid, and there he remained until after the Restoration. In 1662 he returned and was made Secretary of State, in which position his knowledge of foreign affairs made him an influential counselor. He joined the party opposed to Clarendon and after his fall became a member of the famous Cabal. He had assisted in the formation of the Triple Alliance of England, Holland, and Sweden to oppose Louis XIV, but in 1670 turned directly about and joined with the rest of the Cabal in the negotiation of the Treaty of Dover, by which Charles promised to assist Louis against Holland. Together with this open treaty was a secret one by which Charles promised to declare himself a Catholic and to work for the restoration of Catholicism in England. To this secret Arlington, as a reputed Catholic, was admitted, and he assisted with great success in the work of deceiving the other members of the Cabal. The Dutch War and the Declaration of Indulgence, which Arlington supported, destroyed the Cabal ministry, and Arlington fell with them. An attempt was made to impeach him in Commons for furthering Popery, embezzlement, and betrayal of trust, but the attempt failed. However, his influence was gone, though he tried desperately to retain it by throwing himself into the popular party. In 1678, after a disastrous break with Denby, he retired to private life and died in comparative obscurity, July 26, 1685. Arlington, though no great statesman, at times showed gleams of brilliancy, especially in his handling of the secret Treaty of Dover. He was reputed a Catholic, and the charge was probably true, though religion sat as lightly on him as it did on his royal master. Consult *The Arlington Letters* (London, 1710). See TORY.

**ARLON,** ar'lōn' (anciently, Lat. *Orolaunum*). The capital of the Belgian province of Luxemburg, situated 16½ miles, by rail, northwest of Luxemburg, on an elevated plateau of the Ardennes (Map: Belgium, D 5). It contains a museum with a collection of Roman antiquities found in the neighborhood. The town has frequently suffered the ravages of war and was occupied by the French from 1684 to 1697. It came into the possession of Belgium in 1831. Pop., 1900, 10,466; 1910, 12,012.

**ARLT,** ärlt, FERDINAND, RITTER VON (1812–87). An Austrian oculist, born near Teplitz. He studied medicine at Prague and was professor of diseases of the eye there from 1849 to 1856, when he was appointed to a similar chair at the University of Vienna. Arlt was the author of a number of works on the eye and its diseases including *Die Pflege der Augen im gesunden und kranken Zustand* (1846); *Ueber die Ursachen und die Entstehung der Kurzsichtigkeit* (1876), a number of memoirs in the *Archiv für Ophthalmologie*, which he founded in 1854 and edited for many years. His best-known work is *Die Krankheiten des Auges für praktische Aerzte geschildert* (3 vols., 1851–56), which passed through several editions. Consult his autobiography (Wiesbaden, 1887).

**ARM** (Lat. neut. pl. *arma*, arms, weapons). A weapon of any kind; also used to designate a branch of the military service; as, the cavalry arm, the infantry arm, etc. It has, in addition, a wide application in naval and military terminology to express the end, or branch, of anything, particularly of articles or objects that have two similar ends, as yard arms, axle-tree arms (gun carriage), anchor arms, etc. See ARTILLERY; ORDNANCE; SMALL ARMS; SWORDS, and other weapons.

**ARM** (Ger., Dan., Swed., and Dutch *arm*, AS. *earm*, Icel. *armr*, Goth. *arms*, Lat. *armus*, the shoulder, Gk. *ἁρμός*, *harmos*, shoulder joint, all from the Indo-European root *ar*, to fit, join). The upper extremity of the human body. It consists of two portions—the arm, strictly so called, and the forearm; the former having one bone, the humerus, which moves freely by a globular head upon the scapula, forming the shoulder joint; and the latter having two bones, the radius and ulna, which move on the lower end of the humerus, forming the elbow joint, and below, with the carpus, forming the wrist joint.

The humerus is attached by a loose capsular ligament to the scapula, allowing great freedom of motion, and were it not for the muscles would be frequently dislocated, but it is supported by muscles on all sides except underneath or opposite the armpit, in which direction the head of the bone is often driven by violence. The roundness of the shoulder is due to the head of the humerus, so that any displacement is accompanied by a flattening, which at once suggests the nature of the accident. On the shoulder there is a large triangular muscle, the deltoid, which lifts the arm from the side. At the back is the triceps, which extends the forearm; in front are two muscles which flex or bend it—the biceps and the brachialis anticus; and on each side below are muscles passing to the forearm and hand; while above, the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of a groove, wherein lies one of the tendons of the biceps (q.v.). The ulna is flexed by the biceps, and extended by the brachialis anticus and the triceps. The movements of the hand are principally due to the radius, the head of which rotates upon the ulna, thereby turning the palm downward (pronation), or upward (supination), these movements being effected by muscles, which, taking their fixed points from the humerus and ulna, pull the radius round on the latter. The elbow joint is ginglymoid or hinge-like, and therefore has strong lateral ligaments; but it is liable to dislocation and fracture. The accident being often followed by severe inflammation, the joint is very apt to stiffen (see ANKYLOSIS), thereby seriously impairing the usefulness of the limb; it is, therefore, inadvisable to keep the limb too long in any one position after such an injury. (See JOINTS, DISEASES OF.) The upper extremity is supplied with blood by the brachial artery, the continuation of the axillary trunk. The veins collect into large superficial trunks, which unite at the bend of the elbow and then pass on to the axillary, on the outside by the cephalic vein, on the inner side by the basilic. These veins, being superficial and easily accessible, are generally selected for venesection, transfusion, or the injection of medicinal substances. Deep veins also accompany the arteries and pass upward to join the axillary at its commencement.

The nerves of the arm are the musculo-spiral, which winds around the upper part of the humerus to become the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the term "funny bone," from the electric-like thrill which passes along the arm when the nerve is struck. The median nerve, as its name implies, keeps a middle course with the artery.

In wounds of the forearm, bleeding may be at once controlled by pressure on the brachial artery, on the inner side of the biceps.

**ARMADA,** är-mä'dȧ *or* är-mä'dȧ (Sp. an armed force), THE. A name especially applied to the powerful Spanish fleet equipped by Philip II in 1588 for the conquest of England. By permitting the execution of Mary, Queen of Scots, Elizabeth had awakened the indignation of all Catholics; and Scotch, French, and papal leaders forgot their differences and urged Philip to undertake the invasion of England. Santa Cruz, the ablest seaman in Spain, prepared elaborate plans for the fleet which was to subdue England. All his specifications (as to vessels, men, and equipment) had to be considerably reduced, but the King raised enormous supplies in utter disregard of the already almost intolerable burdens of the nation. No attempt was made to disguise the purpose of the unusual activities which took place in the Spanish docks between 1586 and 1588. In consequence, the English were on the alert, the crisis was prepared for, so far as the parsimony of Elizabeth would permit; and in the spring of 1587 Drake raided the Spanish coast and burned all the equipment and supplies of the fleet, causing a delay which gave the English another full year in which to prepare for the attack. Early in 1588 Santa Cruz and his vice-admiral, Paliano, died, and the expedition was intrusted to the Duke of Medina Sidonia, who was wholly unfit for the command. Similar want of judgment was shown in the appointment of the other officers, destined to meet in battle such English seamen as Howard, Drake, Frobisher, and Hawkins. The Spanish counted the victory already won and named the fleet the "Invincible Armada." The English, on the other hand, were anxious but determined. The Spaniards blundered at the very outset. Alessandro Farnese, Duke of Parma, was in Flanders with a large army intended for the invasion of England, but failed to coöperate with Medina Sidonia. The fleet itself, which consisted of 131 vessels with 8000 sailors and 19,000 soldiers, left Lisbon on May 29, 1588. On account of delays due to storms and mismanagement, it was the 30th of July before the English Channel was reached. The fleet now numbered only about 120 ships, of which 70 could not be used in an engagement. The main English fleet, under the chief command of Lord Howard of Effingham, consisted of about 80 ships, all of them available for action; considerably smaller than the Spanish vessels, but much more easily handled and with superior fighting equipment. The English commanders took advantage of this fact and avoided a close contest, such as the Spanish hoped for. Hardly a battle occurred, but for a whole week the light English vessels hung on the rear and flanks of the Armada as it lumbered up the Channel, raking the galleons with rapid shot and escaping almost unharmed from the Spaniards' slow delivery. On August 7 the Armada was driven close to the port of Gravelines, where on the following day Drake made a spirited onslaught upon the Spanish ships. Many of the galleons of the invaders were riddled by the English guns. After a hasty council of war it was recognized that Parma's army could not be transported to England, and Medina Sidonia turned toward Spain. The English gave chase for a short distance, but soon retired, not being provisioned for a long pursuit. It was necessary for the Armada first to sail around the Orkneys, on account of the direction of the wind. A fearful voyage followed, ship after ship being wrecked on the rocky coasts of Scotland and Ireland, and only about 50 vessels returned home. Both Philip and Elizabeth seem to have ascribed the failure of the expedition to the storms, which in fact did very largely influence the result; but the English fleet had almost every advantage that counts in a naval engagement, so that the result under any circumstances could hardly have been otherwise. The destruction of the Armada was the collapse of Spain's naval power.

For a detailed account, consult: Froude, *History of England* (London, 1856–70), and *The*

*Spanish Story of the Armada* (London, 1892); Creasy, *Fifteen Decisive Battles* (New York, 1858): Hakluyt, *Principall Navigations* (London, 1589); Corbett, *Drake and the Tudor Navy* (London, 1898); Gardiner, *Historical Biographies*, "Drake" (London, 1894); Hale, *The Story of the Great Armada* (London, 1913).

**AR'MADIL'LO** (Sp. dim. of *armado*, armed, referring to its bony shell). 1. An edentate mammal of the South American family Dasypodidæ, especially characterized by its bony armor. The term "edentate" is singularly inapplicable to these creatures, as all are provided with true teeth, and indeed from 40 to as many as 90. These are weak, destitute of true roots, and set well apart. The muzzle is elongated, and the tongue is smooth and slender, with a glutinous saliva, adapted to the capture of ants and other insects, after the manner of the ant-eaters, but not long and extensile, like theirs. The limbs are short and strong, as are also the claws, and the animals have a great aptitude for digging and burrowing, by means of which they seek to shelter themselves from enemies—burrowing in sand or soft earth with such rapidity that it is almost impossible to dig them out, and indeed it can only be done by persevering till they are exhausted.

The feature which peculiarly distinguishes the *armadillo*, and in which the animal differs from all the other mammalia, is the bony armor with which the body is covered, and which consists of polygonal plates not articulated, united on the head to form a solid covering, and similarly to form solid bucklers over the shoulders and the haunches; and between these, disposed in transverse bands, which allow of freedom of motion to the body, similar bands in most species protecting also the tail. When alarmed or exposed to danger, armadillos, which have the middle portion of the armor divided into several bands, protect themselves by rolling up into a ball, which exposes only the hard, armored surface. The three-banded armadillo, or apar, of the Argentine pampas (*Tolypeutes tricinctus*) is famous for this and for walking on the tips of its foreclaws.

Armadillos feed not only on insects, but on vegetable and animal food of almost every kind, which by decomposition or otherwise has acquired a sufficient softness. Some of them prefer vegetable food, others delight chiefly in carrion. They are all natives of the warm and temperate parts of South America, in the woods and pampas of which they were formerly found in immense numbers; but all except the omnivorous and adaptable hairy one (*Dasypus villosus*) disappear quickly from the plains wherever a settlement is made. They are timid and inoffensive, although, when they are incautiously assailed, injury may be received from their claws. Their flesh is esteemed a delicacy, particularly that of the species which feeds chiefly on vegetable food. The largest species is fully 3 feet long, exclusive of the tail; the smallest not above 10 inches. The species are numerous, and they are divided among half a dozen or more genera, representing probably three families. The nine-banded armadillo (*Dasypus novemcinctus texanus*) occurs as far north as Texas. This armadillo may be killed by a dog biting through the outer shell, and it is probable that the hard outer covering is of more value in protecting the animal from thorns as it pushes through the tangles of cacti and other plants. The armor also reduces surface evaporation, an important factor in these semi-arid regions. Many thousand are killed annually for the sake of their armor, which is shaped into baskets. (Consult Newman, *The American Naturalist*, September, 1913.) The name "peba" is wrongly applied to the above species and properly belongs to certain South American species of the genus *Dasypus*, to which the non-burrowing peludos, common in the pampas, belong. One of the rarest and most interesting of these animals is the little pichiciago (*Chlamydophorus truncatus*), 5 or 6 inches long, a native of the Argentine Republic, living underground like the mole, which it much resembles in its habits, and feeding on the same kind of food. Its fore feet are adapted for digging, although in a different manner from those of the mole.

The skull is destitute of sutures; there are resemblances to the osteology of birds in the ribs and their union to the sternum; the hinder part of the body is altogether unlike that of any other known animal, in its terminating quite abruptly, as if cut off almost where its thickness is greatest, or as if the back were suddenly bent down at right angles, the tail not springing from where the line of the back appears to terminate, but far below. The whole upper and hinder parts of the body are covered with a coat of mail, made up of a series of square plates; the under parts and legs are covered with long silky hair. See Colored Plate of MAMMALIA; and Plate of ANT-EATERS AND ARMADILLOS.

Fossil remains of gigantic extinct armadillos have been found in the Pleistocene strata of South America, forming the genus *Glyptodon* of Owen.—In *Entomology*, armadillo is a name for wood-lice. See WOOD-LOUSE.

**ARMADO**, är-mä'dō. A bragging Spanish knight in Shakespeare's *Love's Labour's Lost*, evidently conceived in mockery of the euphuists.

**ARMAGEDDON**, är'mä-gĕd'dŏn. The name used in Rev. xvi. 16 to describe the place where the last battle is to be fought on the day of judgment. Some scholars regard it as a transliteration of the Hebrew *har megiddo*, 'mountain of Megiddo,' and quote in support the Argarizim, 'mountain of Garizim,' of Eupolemus in Eusebius, ix. 17, and the references to the plain of Megiddo as a battlefield. Others think that some myth is referred to. The name "Ysemmigadon" ('Υσεμμιγάδων) is found on a tablet of lead discovered in Alexandria and published in *Rheinisches Museum*, xviii, 563 (1863), and also in a magical formula in a Greek papyrus published by Kuhnert in *Rheinisches Museum*, xlix, 49 (1894), as that of a chthonic deity, the consort of Ereshkigal, the goddess of the nether world. Ysemmigadon may be a Sumerian epithet of Nergal, or Migado may be the name of another consort. The Mountain of Migado would then be the place where the battle occurred in primeval times between Migado and Ereshkigal and was expected to occur again at the end of time. Hence the phrase has come to be used for any great slaughter or final conflict.

**ARMAGH**, är-mä' (anciently, Gael. *Ard-macha*, Macha's Height, from *ard*, height, high). A small inland county in the province of Ulster, Ireland (Map: Ireland, E 2). Its area is about 500 square miles, of which about one-twentieth is bog and waste land. Oats, wheat, potatoes, fruit, turnips, and flax are grown, and the making of linen is an important occupation. Large

numbers of cattle, sheep, and hogs are raised. The chief towns are Armagh, Lurgan, Portadown, and Camlough. Pop., 1841, 233,024; 1891, 137,877; 1901, 125,238; 1911, 120,291.

**ARMAGH.** The capital of the county of Armagh, Ireland, near the Ulster Canal, 34 miles southwest of Belfast (Map: Ireland, E 2). It is situated on rising ground and is built largely of limestone quarried in the neighborhood. There are two cathedrals, a Protestant and a Roman Catholic. The former, a cruciform structure dating from the twelfth century, is built of red sandstone and is supposed to occupy the site of one erected in the fifth century by St. Patrick, the traditional founder of the city. The other is a modern building. Armagh is the seat of the archiepiscopal see of the Primate and Metropolitan of All Ireland, in the Catholic and Anglican churches, and has two archiepiscopal palaces. This city has a barracks, a college, a large library founded by Primate Robinson, and a famous observatory. Its benevolent institutions include an infirmary, a fever hospital, and a lunatic asylum. Its chief industries are linen weaving and the manufacture of yarns. Pop., 1901, 7588; 1911, 7356. Armagh, from the year 495 to the ninth century, was the metropolis of Ireland, the native kings living at Emania, 2 miles to the west of the city. It was then renowned for its school of theology and literature. Between 839 and 1092 the town was sacked five times by the Danes. After the Reformation it suffered severely in the conflicts between the English and Irish. It contained only three slated houses in 1765, but since then, owing to the exertions of Lord Rokeby and his successors to the primacy, it has been largely rebuilt. Consult J. Stuart, *Historical Memoirs of Armagh* (Dublin, 1900).

**ARMAGNAC,** är'mȧ'nyȧk' (anciently, Lat. *Ager Aremoricus*, Aremonian territory). The name of an old district in Gascony, France, now mainly included within the department of Gers. Its capitals were Auch and Lectoure. It is a fertile, hilly country, chiefly devoted to the growing of grapes, from which the famous Armagnac brandy is made. The Counts of Armagnac played an important part in French history from the tenth century to the sixteenth. The most celebrated of the line was Bernard VII. During the Hundred Years' War they were leaders of the Nationalist party, opposed to the Burgundians and English. When peace was declared their followers turned to ravaging the country until Charles VII sent them to fight with the Emperor Frederick III against the Swiss.

**ARMAGNAC,** BERNARD VII, COUNT D' (?–1418). The leader of the Orleanist party, in the reign of Charles VI of France, which, from him, took the name *Armagnacs*. The rise of this party was due to the feud between the dukes of Burgundy and Orleans over the possession of the royal power during the incapacity of Charles VI. In the struggle the Duke of Orleans was assassinated and the Burgundians gained the upper hand. Bernard, father-in-law of the Duke of Orleans, assumed the leadership, and in 1413 got possession of Paris. After the battle of Agincourt, in 1415, he became Constable of France. He ruled Paris so oppressively that the populace rose, June 12, 1418, and killed him and all of his party they could find.

**ARMAGNAC,** JEAN V, COUNT D' (c.1420–1473). A grandson of Bernard; a notoriously passionate and wicked man. He secretly married his own sister, fraudulently securing a papal dispensation. Charles VII took away his possessions, but they were restored by Louis XI. Armagnac later joined the "League for the Public Good," and in consequence was driven into Aragon by the King, and his estates were forfeited. At the intercession of the King's brother the estates were returned, but Armagnac remained a fugitive and was put to death by the King's soldiers.

**AR'MAMENT** (Lat. nom. pl. *armamenta*, implements or utensils for any purpose; tackle of a ship). The guns and other weapons of offense supplied to a ship or fortification for use against an enemy. It includes ammunition and gun mountings, torpedoes, torpedo tubes, etc. In a broader sense, it is used to designate the whole or a part of the military and naval equipments or forces of a nation.

**ARMAND,** är'mäN', CHARLES TEFFIN, MARQUIS DE LA ROUARIE (1756–93). A French soldier in the American Revolution. Dismissed from the French service for fighting a duel about an actress, he came to America and (in May, 1777) entered the Continental army as a colonel. In October, 1779, he succeeded Pulaski in command of the "Pulaski Legion" (soon renamed "Armand's Partisan Corps") and in 1783 became a brigadier-general. He returned to France in 1783 and took an active part, on the Royalist side, in the French Revolution. Consult a *Memoir* by Townshend Ward in vol. ii, *Pennsylvania Magazine of History and Biography* (Philadelphia, 1878).

**ARMANDE,** är'mänd'. The elder sister of Henriette, in Molière's *Les femmes savantes*.

**ARMANSPERG,** är'mȧns-pĕrk, JOSEPH LUDWIG, COUNT VON (1787–1853). A German statesman, born in Lower Bavaria. In 1826 he was appointed Bavarian Minister of Foreign Affairs, and soon after exchanged that office for the portfolios of the Interior and the Finances. He drew upon himself the hatred of the Camarilla by his strenuous opposition to the claims of Rome, as well as by his attempts to identify himself with the Liberal party, and the Roman Catholic clergy brought about his dismissal. He accompanied the young King Otho to Greece in 1833, where for four years he acted as regent or chancellor. Greece derived many benefits from his administration.

**ARMATOLES,** är'mȧ-tōlz. A body of Greek militia, first formed under the reign of Sultan Selim I about the beginning of the sixteenth century. They were organized to preserve the fertile plains from the ravages of the *klephts*, Christian mountain robbers of Thessaly, Epirus, and Macedonia (from Gk. κλέπτης, *kleptēs*, robber), who had never been entirely conquered by the Turks. The Armatoles themselves were originally klephts, but received their more honorable designation when the Porte had transformed them into a sort of military police. The safety of the public roads was intrusted to their care. The whole of northern Greece was divided into 14 districts, each placed under the supervision of a chief of these militia, who, however, had himself to receive orders from a Turkish pasha or Greek bishop. But although the Armatoles frequently suppressed the brigandage of the klephts, they still regarded them in the light of brothers, inasmuch as they had a common origin and faith; both detested the oppressors of their country, and the sentiment of patriotism overruled every other consideration.

This sympathy at last appeared to the Turks so dangerous that they grew alarmed, and desired to substitute for the Armatoles, the Mohammedan Albanians, who were the implacable enemies of the Greeks, which resolution did not a little to hasten the insurrection which the Porte ever dreaded. The moment it broke out, the Armatoles pronounced themselves in favor of the national cause, and in the war of independence that ensued, distinguished themselves by their brilliant exploits. Marco Bozzaris (q.v.), leader of the Suliotes, was a good type of the Armatole leader.

**AR'MATURE** (Lat. *armatura*, armor; Ger. *Anker*). The mass of iron or other magnetizable substance upon which is exerted the power of attraction possessed by a magnet, or which is placed in contact with its pole or poles. In the case of a permanent magnet of the horseshoe pattern, the armature may be of soft iron and is known as the *keeper*, as it helps to retain and preserve the magnetism by completing the magnetic circuit through the two poles. The armature of an electro-magnet is placed near its poles, and whenever a current of electricity is sent through the coils of the latter the armature is attracted. If the armature is a piece of soft iron, attraction always takes place, and on this principle is based the action of the electric bell, the telegraph sounder, and other forms of electrical apparatus. Such an armature, as soon as the flow of the current ceases, returns to its normal position under the action of gravity or of a spring. If the armature is a permanent steel magnet or another electro-magnet, it may move either toward or away from the main electro-magnet, depending on its polarity, and in that case is known as a polarized armature. In dynamo-electric machinery, the term "armature" is used to designate that portion of the machine comprised where an active conductor is moved across the magnetic lines of force of the field magnets and in which the differences of electric potential producing the current are generated. The term is generally employed to describe the part which is revolved between the poles of the field magnets of a dynamo or electric motor, though in alternators the armature may be stationary and the field coils revolve. The iron cores on which the coils comprising the armature are wound afford a magnetic connection between the poles. Consult Cramp and Cramp, *Armature Windings of the Closed Circuit Type* (London, 1906); Kinzbrunner, *Continuous Current Armatures* (New York, 1906). See MAGNETISM; DYNAMO-ELECTRIC MACHINERY, and the authorities there cited.

**ARMBRUSTER,** ärm'brŏŏs-tẽr, CARL (1846—). An anglicized German orchestral conductor. He was born at Andernach and studied with private teachers at Cologne, where he began his career as a pianist. In 1863 he settled in London. Here he soon became prominent as an ardent advocate of Wagner, whose works he conducted after 1881 at the Royal, Haymarket, Covent Garden, and Drury Lane theatres. During the London Wagner Festivals of 1882 and 1884 he acted as Hans Richter's assistant and from 1884 to 1894 he was one of the conductors at Bayreuth. In 1901 he became musical adviser to the London County Council. His most effective means of propaganda in behalf of Wagner, and some other modern composers also, was the illustrated lecture. In his capacity as lecturer he made a successful tour of the United States in 1900–01.

**ARME BLANCHE,** ärm' blänsh'. A term of French origin, meaning 'white arm.' It has special application to the dueling foil or rapier (see FENCING), but is often applied to all weapons other than firearms, such as foil, rapier, sword, lance, and dagger.

**ARMED NEUTRAL'ITY, THE.** An association of European powers which, under the leadership of Russia, first gave international validity to the doctrine, proclaimed by Prussia in 1752 and by France in 1778, that "free ships make free goods." Because England insisted on her right to search neutral ships for her enemies' goods in the early years of her war with America, France, and Spain (1775–83), and in consequence crippled the commerce of non-combatant powers, Catharine of Russia, on March 8, 1780, issued her famous proclamation laying down the principles: (1) That neutral ships may freely sail from port to port and along the coasts of belligerents; (2) that a blockade, to be recognized, must be effectual and real; and (3) that, except in the case of contraband, free ships make free goods. These principles were immediately indorsed and adopted by the United States, France, and Spain; and an association, ultimately composed of Russia, Denmark, Sweden, the Netherlands, Prussia, the Empire, Portugal, Austria, and the Two Sicilies, was organized for the purpose of enforcing them upon the belligerent powers. The immediate effect was greatly to embarrass England by placing her in diplomatic hostility to the rest of Europe, by increasing the probability of an extended war, and by lessening the advantage which her naval preponderance gave her. The enunciation of the doctrine of "free ships, free goods," at that time marked an epoch in the history of international maritime law. See the article NEUTRALITY.

**ARMED SHIP.** A ship carrying an armament in contradistinction to one without armament. The term is generally used to designate merchant vessels taken into the service of the government and supplied with a battery; but it was formerly used with reference to private vessels fitted out, by permission of a government, to operate against an enemy's commerce; that is, a privateer. The term has acquired additional importance in recent years, as certain unarmed vessels of the enemy, such as cartels and hospital ships, are exempt from capture; and the tendency of the usages of maritime war, in respect to private unarmed ships, is toward increased exemption from capture.

**ARMENGAUD,** är'mäN'gō', JACQUES EUGÈNE, called ARMENGAUD THE ELDER (1810–91). A French inventor and draughtsman. He was born at Ostend and was educated at the Ecole des Arts et Métiers at Châlons. He was professor of mechanical drawing at the Conservatoire des Arts et Métiers at Paris, where, in collaboration with his brother, he published a monthly review entitled *Le Génie Industriel*. His works on engineering include: *Traité théorique et pratique des moteurs hydrauliques et à vapeur* (1858); *Nouveau cours raisonné de dessin industriel appliqué à la mécanique et à l'architecture* (with his brother Charles, 1848–60). He was decorated with the Legion of Honor in 1863 and his work has been recognized by many scientific associations.

**ARME'NIA** (Assyrian *Urartu*, OPers. *Ar-*

*maniya*, Pers. *Armina*). A tableland in western Asia, about 6000 feet high, situated to the southwest of the Caucasus Range, stretching southward toward the lowlands of Mesopotamia, and extending from the highlands of Asia Minor on the west to the vicinity of the Caspian Sea. Armenia, in the widest sense of the name, is included between the parallels of 37° 30′ and 41° 45′ N. lat., and the meridians of 37° and 49° E. long. It embraces the northeast corner of Asiatic Turkey, the southern part of Transcaucasia (Asiatic Russia), and the northwest corner of Persia. The principal portion, having an area in round numbers of about 70,000 square miles, belongs to Turkey (Map: Turkey in Asia, J 2), and is included in the vilayets of Erzerum, Van, Bitlis, Mamuret-ül-Aziz, and Diarbekr. The Russian portion (acquired in part from Persia in 1828 and in part from Turkey in 1878) is included in the governments of Erivan, Yelisavetpol, and Tiflis, and the Territory of Kars. Persian Armenia forms part of the province of Azerbaijan. A great part of the region called Kurdistan is included in southern Armenia. In antiquity Armenia was divided into Greater and Lesser Armenia, the latter (a small fraction of the whole) being separated from the former by the western head stream of the Euphrates. The plateau surface is covered with a series of mountain ranges, mostly of volcanic origin, inclosing elevated plateaus of archaic and Palæozoic origin in the north, with sedimentary rocks in the south, the surface of which consists in part of pasture land. Of the mountain peaks, Mount Ararat, situated where the frontiers of Russia, Turkey, and Persia meet, has an altitude of nearly 17,000 feet. Armenia is watered chiefly by the Euphrates, Tigris, Churuk Su, and Aras. It contains two extensive salt lakes—Van, in Turkish Armenia (elevation 5100 feet), Urmia, in Persian Armenia (elevation 4000 feet). Lake Gokcha, in Russian Armenia, sends its waters to the Aras.

The climate of Armenia is generally healthful, but the temperature has great variations, in some places ranging from —20° to 85° F. Long and severe winters are followed by very short springs, beginning in April. The summers are hot, and grains and fruit ripen very early. The rainfall is generally scant, and artificial irrigation has been resorted to for centuries. The flora varies considerably, in accordance with the elevation of the surface. Trees are found at an altitude of nearly 9000 feet, and even higher on the southern slopes. Wheat grows freely as high as 7000 feet above the sea. Southern fruits, such as olives and figs, are cultivated successfully in the warmer regions, while the common fruits are found everywhere. Tobacco, cotton, and rice are cultivated in the warmer valleys. The domestic animals, especially horses and sheep, are well known; while the wild animals, such as the bear, wolf, tiger, hyena, leopard, etc., are still found in the forests. The soil is generally fertile and well adapted for agricultural purposes.

The turbulent state of the country under the despotic rule of Turkey had always been a serious obstacle to natural development, and as a result agriculture was very much neglected. Armenia has considerable mineral wealth. The chief minerals are marble, saltpetre, iron, copper, quicksilver, lead, and gold. The population of former Turkish Armenia (chief city Erzerum) was estimated at about 2,470,000. Of this number, about 650,000 were Armenians, the bulk of the population consisting of Turks and Kurds. The Armenians in Transcaucasia numbered 1,118,094 by the Russian census of 1911. The number of Armenians in former European Turkey was placed at 500,000, and in the former limits of Asiatic Turkey outside Armenia at 576,000. Smaller numbers are in Persia, Ciscaucasia, Hungary, Transylvania, Galicia, India, and Africa, and after 1900 many emigrated to the United States. Changes of population on account of Turkish massacres, deportations, etc. during and after the war were the subject of contradictory estimates. See WAR IN EUROPE.

**Ethnology.** By language the Armenians, or, as they call themselves, Haik, are entitled to rank as a very old branch of the Aryan stock, in some respects intermediate between the Aryans of Europe and the Aryan peoples of Greater Asia. Physically also they are of a primitive type, short and thickset, dark-skinned, and of exaggerated brachycephalism, in part artificially induced. They are thought to be related, on the one hand, to the "Alpine" stock in Europe, and, on the other, to the Galtchas, etc., of central Asia. Their physical type is probably less pure than is assumed by Ripley (1899), but not so mixed as Deniker (1900) supposes. They inhabited in early prehistoric times a considerable portion of Asia Minor and have contributed to, or borrowed from, Aryans of other types, Semites, Caucasic peoples, and later intruding Europeans and Turks. Prof. F. von Luschan (1911) is of opinion that the modern Armenians are the descendants of the pre-Semitic population of the region, whom he identifies with the old Hittites. He also believes that from this same Armenoid race came the so-called "Alpine race" of Europe. Their racial, social, and religious solidarity, and their position in a land that has seen so much of the beginnings of the civilizations of the white race, make them one of the most interesting peoples of Asia. They are conspicuous by their industry, intelligence, and aptitude for commercial pursuits, and in many cities of the East they are the principal merchants and money lenders. The bulk of them belong to the so-called Armenian church. Consult Chantre, *Recherches anthropologiques dans l'Asie occidentale* (Lyon, 1895), and Von Luschan, "The Early Inhabitants of Western Asia," in the *Journal of the Royal Anthropological Institute* (London, 1911).

**Archæology.** Cities abounding in superb palaces and temples existed in Armenia from remote antiquity. Armais, grandson of Haig, the conqueror of Nimrod, is said to have built the town of Armavir, long the capital of Armenia, on the banks of the Araxes. When, according to the tradition, Semiramis conquered the country, Semiramocerte, now Van, was built, where important excavations and discoveries have been made in recent years. Christianity, introduced by Gregory the Illuminator, and adopted by his royal convert, Tiridates, c.312, resulted in the demolition of the pagan temples throughout the kingdom and the endowment and building of Christian churches. Among the most interesting examples of Armenian architecture dating from this period are the remains of fortifications, the castle, cathedral, and chapel at Ani, the ruins at Akhlat and at Talin, the troglodyte city of Vardzia, the mediæval castle of Khertvis, the church at Saba, built by

Atabeg Sargis (1306–34), and the one at Etchmiadzin, the cathedral of St. Gregory, the monastery and the churches of St. Gaina, St. Ripsima, and of Shoghakath, with its finely sculptured stones.

**History.** The Armenians trace their descent from Haig, or Haik, the grandson of Japhet. His descendant, Aram, is the eponymous hero of the land, which was called Armina by the Persians, and Haik, or Haiastan, by the Armenians themselves. Though possessed of an old civilization, the Armenians first appear in history about the middle of the sixth century B.C., when Dikran, or Tigranes, of the Haig dynasty, freed his nation from its subjection to the Assyrians and the Medes. Subdued by Alexander the Great, the country was ruled by the representatives of the Seleucid kings until 190 B.C., when the satraps Artaxias and Zariadres revolted against Antiochus the Great and divided the province between them, the former taking the country east of the Euphrates, or Armenia Major, the latter the western portion, or Armenia Minor. Armenia Major was subdued by the Parthians about 150 B.C., and ruled, except for a brief period of Persian domination, (232–260 A.D.), till 428 A.D. by the family of the Arsacidæ (q.v.). The most celebrated prince of the line was Tigranes the Great, who, drawn by his father-in-law, Mithridates, into a quarrel with Rome, was completely overthrown at Tigranocerta (69 B.C.) by Lucullus, but was left in power as a client king of the Romans. Armenia thus became a buffer state between the Roman Empire and the Parthians and was controlled in rapid alternation by the two powers. In 387 A.D. the Byzantines and the Persians definitely partitioned the country, the line of the Arsacidæ continuing to rule in Persarmenia 40 years longer.

About the year 285 Christianity was introduced into Armenia by Gregory the Illuminator, who succeeded in converting the King, Tiridates III. Zoroastrianism, the old religion of the country, collapsed, the people imitated the example of their monarch, and the earliest national Christian Church in the world arose. The Sassanid rulers of Persia vainly endeavored to extirpate Christianity and succeeded only in plunging the country into anarchy. The first 250 years of Arab rule (636–885) were marked by bitter conflicts between Mohammedans and Byzantines, but in 885 Ashod I, a descendant of the ancient Jewish family of the Bagratidś, or Pagratids, was made King, under the suzerainty of the Caliph, and for more than 100 years the land enjoyed peace. Then ruin came upon it in the shape of Byzantine and Mongol invasions. The Seljuk Turks and after them Timur devastated the land.and occupied a portion of it, while the Byzantines seized the rest. The land was subjugated by the Persians in 1472, but part of it was wrested from them by the Ottomans 50 years later and permanently incorporated into their Empire. The northeastern portion of Armenia Major was taken from the Persians by Russia in 1828, who added to her possessions in 1878 the Turkish country of Kars and Batum.

Armenia Minor for a long time had a history of its own. It was made a Roman province in 70 A.D.; was conquered from the Byzantines by the Arabs about 633, and recovered by the Byzantines 120 years later. In 1080 Rhupen, a descendant of the Bagratids, made himself independent in Armenia Minor; his successors extended their power over Cilicia and Cappadocia and aided the Crusaders against the Saracens. The house of Rhupen fell in 1393, and the land, after passing through the hands of the Egyptians and the Persians, came into the possession of the Turks in 1541.

Armenia, therefore, at the present is merely an historical conception. The ancient land is divided among the Turks, the Russians, and the Persians, and the Armenian people have been scattered over Asia Minor and a considerable territory in Europe. Aspirations toward national unity have not been wanting among the Armenians, especially those dwelling in Asiatic Turkey. After 1885 a revolutionary movement, inspired by the Russian Nihilist propaganda, attained formidable dimensions. The Porte intrusted the pacification of the country to the Kurds, who constitute the national police. Sanguinary conflicts, marked by outrageous cruelty on both sides, occurred between the revolutionists and the police in the provinces of Trebizond, Bitlis, and Erzerum, and it was the news of the atrocities, committed by Kurds, acting in their official capacity, that stirred Europe and America to horror in the years 1895 and 1896. Signs of anti-Armenian feeling had appeared throughout Asiatic Turkey as early as the spring of 1894. In August of that year a massacre of Armenians was perpetrated at Sassun, and the fever of murder spread all over Asiatic Turkey. All through the spring and summer of 1895 the slaughter of Armenian men, women, and children continued, until the representatives of England, France, and Russia, backed up by their assembled warships, wrested from the Sultan the promise of reparation and reforms. A commission was sent to the scene of conflict to investigate conditions there, and the Armenian Patriarch was summoned to Constantinople to state the demands of the Armenians, which included a share in the making of laws and the administration, and proportional representation in the national police. The Sultan's *irade* went forth, the commission labored, and the massacres continued. During the months of October and November Armenians were butchered at Trebizond, Erzerum, Akhissar, Bitlis, Zeitun, Swas, Kurun, and Marash. At Diarbekr a pitched battle was fought betweeen Turks and Armenians, in which 5000 men perished. In the provinces of Erzerum and Trebizond entire villages were devastated, famine and plague attacked the survivors of the massacres, and the Turkish government was forced, only after the greatest reluctance, into permitting the work of relief organized by Clara Barton and the Red Cross Society to be carried on. The outrages subsided in 1896, but in August occurred a fearful carnage of Armenians in the streets of Constantinople, perpetrated by a mob at the instigation of the government, in retaliation for the attack on the Ottoman Bank made by Armenian patriots, August 26–28. At least 4000 Armenians were beaten to death by the clubs of hired ruffians. (For the revolutionary movement and disturbances of 1905–06 in Russian Armenia, see RUSSIA.) Nor could reparation be demanded of the Turkish government, inasmuch as the Armenian revolutionists, by their riotous action, had put themselves and their innocent countrymen outside of the law. Since 1896 the sporadic slaughter of Armenians on a minor scale has continued to the present day; and no real guarantees for the safety of the

unhappy people have been exacted from the Turkish government.

**Religion.** See ARMENIAN CHURCH.

**Bibliography.** The best modern work on Armenia is Lynch, *Armenia* (New York, 1901), which contains a good map and an exhaustive bibliography; Noguéres, *Arménie; géographie, religion, mœurs, littérature, situation actuelle* (Paris, 1897); Tchobanian, *L'Arménie, son histoire, sa littérature, son rôle en Orient* (Paris, 1897); Ozhderian, *The Turk and the Land of Harg, or Turkey and Armenia, Descriptive, Historical, and Picturesque* (New York, 1898); Tiele, *Western Asia, According to Most Recent Discoveries* (London, 1893); Kolenati, *Die Bereisung Hoch Armeniens* (Dresden, 1858); Bryce, *Trans-Caucasia and Ararat* (London, 1896); Barkley, *A Ride through Asia Minor and Armenia* (London, 1891); John Catholicos, Patriarch of Armenia, *Histoire d'Arménie*, translated by Saint-Martin (Paris, 1841); Langlois, *Rapport sur l'exploration archéologique de Cilicie et de la Petite Arménie* (Paris, 1854); Sayce, *The Cuneiform Inscriptions of Van* (London, 1882–88–93–94); Hyvernat, *L'histoire ancienne de l'Arménie et les inscriptions cunéiformes du bassin de Van* (Paris, 1892); Deniker, *Races of Man* (London, 1900); Belck and Lehmann have published a number of valuable articles on Armenian Archæology and Ethnology in the *Verhandlungen der Gesellschaft für Anthropologie* (Berlin, 1900–01); De Cursons, *La Rebellion Arménienne* (Paris, 1895); Lepsius, *Armenia und Europe* (Berlin, 1896); Gladstone, *The Armenian Question* (London, 1893); Nazarbek, *Armenian Revolutionists upon Armenian Problems* (London, 1895); Zahn, *Die Stellung Armeniens in Gebirgsbau von Vorderasien* (Berlin, 1908); Adossidès, *Arméniens et jeunes Turcs* (Paris, 1910).

**ARMENIAN ART.** This art and that of Georgia are so closely related as to form but a single style, which might be called the art of the Caucasus. Its early antiquities are not very well known: they are related to those of the Sarmathians and Scythians of Turkestan and Siberia and of the cities of Crimea and the Bosporus. In northern Armenia there are thousands of graves in the form of large mounds, and especially near Kaaban there are many dolmens. It is from these tombs (e.g., Koban and Kamunta) that the objects have come which show us the condition of the arts here just before and after the Christian era began. It was rather late when both Persian and Roman influences penetrated simultaneously. Building had been almost entirely in wood, except in the case of the numerous fortresses. The only ruins yet studied of the Roman period are those of Karni. This region seems to have become an important centre for the propagation of that most interesting form of barbaric art which we associate with Goths, Celts, Scandinavians, Anglo-Saxons, Lombards, and other early Germanic tribes, and of which the treasury of Guerrazar is the most brilliant example. Its main characteristics are the technique of cloisonné enamel, the setting of colored glass in metal bands soldered to a metal ground, and the use of geometric ornamentation. Beginning in central Asia, it passed westward, apparently with the emigration of the Goths, by whom it was presumably imparted to the other tribes. Shortly after, when the country had become christianized, the history of architecture and monumental sculpture in this region began. The churches built between the seventh and sixteenth centuries are not large, but have considerable character.

The Caucasus felt the influence of Byzantine art at all times, but added to it, and to its own inherited traits, something from Syria, whose missionaries had converted it and formed its literature. At one time Armenia became, in fact, a province of the Empire politically as well as artistically. Then, during the Middle Ages, the crusaders gave a western tinge, and still later came the influence of Russian art. The earliest known church of Armenia, St. Ripsima's at Vagashabad (618), is thoroughly Byzantine, a Greek cross with its four arms ending in apses and a central dome raised on a drum, circular inside and polygonal outside. As in so many Byzantine churches, the cruciform plan does not appear on the outside, as chapels fill in the spaces between the arms. The church at Usunlar, with its peristyle colonnade, dates from 718 to 729. Both are still without ornament. It is possible that the church at Dighbur, from its similarities to buildings in central Syria of the sixth century, may be even earlier. Pitzeuda (c. fifteenth century), with its high dome and tunnel vaults, is very Byzantine. The culmination of a new style appears in the cathedral of Ani (1010 A.D.), the most interesting church of Armenia. The exterior, with its central dome raised on a high square drum, its exterior decorated with colonnettes, its internal clustered piers and pointed arches, as well as its vaulting system, reminds us in many ways of the European architecture. At the same date a church was built at Mokwi, Byzantine in every particular, and with the greatest similarity to the early Russian church of St. Sophia at Novgorod. The contemporary cathedral of Kiutas in Imerethia is of equal importance, but its plan is basilical instead of a Greek cross. This century was most prolific. In Abkhasia, the church of Mowki, with a charming dome and five naves with slender stone piers and cornices of great delicacy; that of Martvili, in Mingrelia, with exquisite decorative details, are samples of a numerous class of which others are at Manglis, Kaben, Sion, Zarzma, etc. Later, in the twelfth century, are others at Bethania, Vardzia, Ghelathi. The purely architectural moldings are very simple: a cornice of a simple cove, sometimes decorated with painted or carved palmettes or foliage; a rude, ball-shaped capital; a torus molding woven into patterns and often carried out so as to join the windows and decorative plaques in one scheme of ornament covering the whole façade. The climax is reached in the fifteenth century in the church of Mtzkhet in Georgia, Armenian in its dome and plan, Byzantine in its proportions, Georgian in its rich interlaced decorative patterns with the addition of Byzantine floral designs. Statuary and figures in relief appear to have been systematically avoided, and when used were crude and provincial. In some churches the king, bishop, or architect is represented holding the model of the building; or Christ is blessing. But the animal and decorative sculpture is much more artistic. The fighting animals are a reminiscence of Persian art; the peacocks, doves, griffins, and dragons, heraldically arrayed or intertwined with vines, are derived from Byzantine models.

The most successful use of decorative sculp-

ture is in the broad bands surrounding the church windows and in the panels let into the walls. These are in very flat and low relief, and are often highly original, differing from Byzantine work and bearing a most remarkable resemblance to the patterns in Celtic-Irish, Anglo-Saxon, and Frankish illuminated manuscripts. This is especially the case in churches of the eleventh to the fifteenth centuries. It is interesting that inscriptions were turned to extremely decorative purposes, just as they were in Mohammedan art. The most decorative class of smaller works are the sepulchral slabs usually erected like antique stiles on pedestals in the open air. Their design is graceful in outline and delicate in the detail of their arabesque and lace-work patterns around a central cross or rosette. One cannot help seeing in such as these the originals of the famous Irish, Welsh, and Saxon stone crosses, which are far less exquisite in design and execution. Wood carving and ivory carving were practiced, as is shown by some church doors and a multitude of images, book covers, crosiers, crosses, and other bits of handiwork. But the highest efforts of Georgian and Armenian decoration, with its amalgamation of Sassanian-Persian, of Byzantine and Mohammedan design, are shown in the goldsmith's work, where the metals are combined with enamels and set stones. The treasuries of monasteries and churches in Suanetia, Mingrelia, and other provinces are still extremely rich in such works; especially Etchmiadzin, the national sanctuary of Armenia, Ghelathi, Khopi, Tchukul, etc. None of them are earlier than the tenth century. In most cases the ornamentation surrounds some sacred image. The elaborate geometric design, so difficult to follow and yet so thoroughly scientific, winds over the entire gold surface inclosing the enamels surrounded by pearls, the precious stones framed in golden *cloisons*. The cloisonné enamel employed is another link both with Byzantium and with the primitive jewelry of the Goths and their imitators, the Germanic tribes. It is probable that the process originated in this very region. The local style of figured enamels, of great originality in the ninth to twelfth centuries, and independent of Byzantium, is brilliantly shown in those of the Khakul image at Ghelathi and others at Sion, Djumati, Khopi, etc. In jewelry, figured compositions were not avoided, as in large sculpture, especially where the art came strongly under Byzantine influence, and the figures in their crude realism and exaggerated movement again connect with Carlovingian and other branches of the north European art of early mediæval times rather than with Byzantium. Religieuses, gold images, triptychs, crosses, chalices, book covers, are among the forms taken by this jewelry. They are found in dozens of church treasuries. Wall painting was very general during the entire period, and here again considerable independence of Byzantium was shown. The only example of the mosaic work so universal among the Greeks is at Ghelathi and was a present to King David from Emperor Alexis Comnenus. Caucasian painting was far less stiff and classic than Byzantine. It admitted historic scenes more frequently, and the desire of the artists to glorify events of national interest is shown vividly in frequent portraits of the sovereigns of Georgia and Armenia. Such frescoes are at Sion (eleventh century), Nekresi (eleventh century), and especially Ghelathi and Bethania. On the other hand, in the numerous illuminated MSS. of the same period (eleventh to fifteenth centuries), Byzantine influence predominated. The Georgian are the earliest, and attained perfection in the eleventh century. More numerous, but later, are the Armenian. The largest collections of such MSS. are in the Armenian Library in Venice, and in that of the monastery of Etchmiadzin. The thirteenth century marks for this, as well as for most other branches of art, the highest point of perfection. In the seventeenth century foreign influences—especially Italian and Persian—began to predominate. See ARCHITECTURE; ART, HISTORY OF; BYZANTINE ART.

**Bibliography.** Consult for pre-Christian antiquities: Kondakoff, Tolstoi, and Reinach, *Antiquitiés de la Russie méridionale* (Paris, 1891); see also Dubois de Montpérieux, *Voyage autour Caucase* (Paris, 1839–41); Brosset, *Voyage archéologique dans la Géorgie et l'Arménie* (St. Petersburg, 1849–51); Prince Gagarin, *Le Caucase* (Paris); Mourier, *L'art religieux au Caucase* (Paris, 1887).

**ARMENIAN CHURCH.** Christianity appears to have been introduced in Armenia as early as the second century. It was for the first time firmly established, however, when Bishop Gregory the Illuminator baptized Tiridates, the King (301), and a great party of the people became immediately baptized Christians. (See ARMENIA.) The Bible was translated into the Armenian language in the fifth century by Mesrob and Sahak. After this period great activity prevailed in the Armenian church. Numbers flocked to the colleges at Athens and Constantinople. In the ecclesiastical controversy concerning the twofold nature of Christ the Armenian Christians held with the Monophysites, refused to acknowledge the authority of the Council of Chalcedon, and constituted themselves a separate Church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself among them to a far wider extent than in the other Eastern churches. Their greatest divine is Nerses IV, Patriarch of Armenia, and Catholicos, from 1166 to 1173, whose works have been repeatedly published (Lat. trans., 2 vols., Venice, 1833); his *Prayers* in 36 languages (1882). The Gregorians have continued to entertain a deeply rooted aversion to the Orthodox church. The Roman Catholic Popes at various times, especially (1145, 1341, 1440) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognize the papal supremacy; but for the most part only the nobles consented to do so, while the mass of the people clung to their ancient opinions, as we see from the complaint of Pope Benedict VII, who accuses the Armenian church of 117 errors of doctrine. There is a sect of United or Roman Catholic Armenians in Italy, Galicia, Persia, Russia, and Marseilles, who accept the papal supremacy. It dates from 1439. Seventeen dioceses are now subject to their patriarch, but he has no authority over Armenians in Russia and Austria. The attempt of Pius IX, in 1867, to Romanize the sect still further, led to a split, and the rebellious fraternized with the Old Catholics in 1872. The congregation of the Mechitarists, founded by the Abbot Mechitar in 1701 at Venice, have done much to

spread the Roman faith among their people. In theology the Orthodox Armenian church attributes only *one* nature to Christ, and holds that the Spirit proceeds from the Father alone, this doctrine, however, being held by it in common with the Orthodox Greek church, although contrary to the theology of the Western churches. With respect to the "seven sacraments," it holds that at baptism one must be sprinkled three times and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's Supper must be celebrated with wine and leavened bread; that the bread, before being given, must be dipped in the wine; and that extreme unction is to be administered to ecclesiastics alone, and immediately after (and not before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek church in the number of its fasts, but has fewer religious festivals. These, however, are more enthusiastically kept. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is carried on in the new. The sacerdotal constitution differs little from the Greek. The head of the Armenian church is called the Catholicos. He resides at Etchmiadzin, in Russian Armenia. Under him are bishops. The Russian government claims the right of appointing him. But of more consequence are the patriarchs of Jerusalem and Constantinople, who are nominally under the Catholicos. The monks of this church follow the rule of St. Basil. The wartabieds (vartabeds) form a peculiar class of ecclesiastics; they live like monks, but are devoted exclusively to learning and preaching. Secular priests must marry once, but none is at liberty to take a second wife. Since 1830 very successful Protestant missions have been carried on among the Armenians. Consult Malan, *Divine Liturgy of the Armenian Church* (London, 1870), and Adenev, *Greek and Eastern Churches* (New York, 1908).

**ARMENIAN LAN'GUAGE AND LIT'ERATURE.** The Armenian language forms one of the eight main divisions of the Indo-Germanic group. Owing to the presence of many loan words from the Iranian languages, Armenian was for a long time supposed to be an Iranian dialect, and this theory was defended especially by Paul de Lagarde and Friedrich Müller. A more scientific investigation of the language, however, has overthrown this view, and the independence of the Armenian has been conclusively shown. For this great contribution to philology we are indebted most of all to Heinrich Hübschmann. Valuable studies on the Armenian language and literature have also been made by Meillet, Bartholomæ, Bugge, and others. The Armenian language is divided into two parts: The Old, or Classical (*grabar*) Armenian and the Modern Armenian. The Classical Armenian language shows no dialectic variations, but the Modern Armenian has many dialects, whose study is most important for a correct philological knowledge of this Indo-Germanic tongue. The Classical Armenian is a fully inflected language, possessing seven declensions with six cases (nom., gen., dat., acc., abl., and instr.), and two supplementary cases (narrative and circumlocutory). There is also, as in all Indo-Germanic languages, a special mode of declension for the pronouns. There is no gender in Armenian, and but two numbers, singular and plural. Comparison of adjectives, which are often uninflected, is chiefly by auxiliary adverbs or by repetition of the adjectives to be compared. There are four conjugations, of which the fourth is generally passive in force, with present, imperfect, first and second aorist, and first and second future, present and future participle, and infinitive tenses. As in Greek, but one of the futures and aorists is commonly found in the same verb. The moods are the indicative, subjunctive, imperative (or more properly, prohibitive). The Modern Armenian differs from the *grabar* chiefly in the decay of its inflectional system, in the development of postpositions, in the influx of loan words from the Turkish, and in the interchange of pronunciation of the old *tenues* and *mediæ* with the new (Classical Armenian *b, g, d, k, p,* etc., pronounced *p, k, t, g, b,* etc., in Modern Armenian). The Armenian is fond of harsh combinations of consonants, and it is particularly rich in affricative sounds. The accent is usually on the last syllable. The Armenian alphabet consists of 36 letters, to which two others, *ō* and *f*, were added in the twelfth century. This alphabet was introduced by Mesrop, a bishop of the Armenian church, early in the fifth century, and was probably based upon the Greek letters, with additions from other sources to provide characters for sounds not represented in the Greek alphabet. In addition to the sounds familiar to our ears, Armenian possesses characters for the indefinite *e* in *the man*, for *zh* (French *j*), *h* (as in German, Greek χ), *sh, ts, ds, tch, dsh, thsh, tsh,* rolled *r*, for the aspirates *th, ph, kh*, and for a deep glottal catch corresponding somewhat in pronunciation to the Arabic *ghain*. As for its relation with the other Aryan languages, it is generally placed about half-way between the Indo-Iranian and the Letto-Slavic groups.

Armenian literature, properly speaking, begins only with the fifth century, when Mesrop devised the alphabet, and the entire Bible was rendered into Armenian by 410. Before the time of Mesrop there had been no Armenian literature (although a few Armenian songs are preserved by Moses of Chorene) despite the claims made for Agathangelos (ed. Venice, 1862, Tiflis, 1883) and Faustus of Byzantium (ed. Venice, 1889), who probably wrote in Greek, and was translated into Armenian later. Armenian literature is especially strong in history and in theology; but in poetry and belles-lettres it is very weak, and the drama does not exist. The principal Armenian writers (exclusive of translators) are as follows: Fifth century, Eznik of Golp, *Refutation of Heresies*, especially valuable for its account of the Zoroastrian and Manichæan religions (ed. Venice, 1850); Moses of Chorene, *History of Armenia*, a good source of material, though not always reliable (ed. Amsterdam, 1695, London, 1736, Venice, 1752, 1827, 1865, 1881, trans. by Le Vaillant de Florival, Venice, 1841, and by Lauer, Regensburg, 1869), and a geography often attributed to him (ed. and tr. Venice, 1881); *David the Philosopher* (ed. Venice, 1823); Elisæus, *History of Vardan and of the Battles of the Armenians* (ed. Constantinople, 1764, 1823, Venice, 1828, 1852, 1859, 1893, tr. Neumann, London, 1830); eighth century, John of Ozim, a theological writer (ed. Venice, 1834); tenth century, Thomas of Ardsruni, an important historian; Gregor Narek, religious writer (ed. Venice, 1827–40); eleventh century, Gregor Magistros, theologian, grammarian, and poet; twelfth century, Nerses

Klayensis, poet, theologian, historian (ed. of his poetry, Venice, 1830), and his nephew, Nerses of Lampron, theologian, poet, and translator; Mechitar Gosh, fable writer (ed. Venice, 1854) and lawyer (ed. Etchmiadzin, 1880); thirteenth century, Vardan, who composed an important history of Armenia (ed. Venice, 1862), a book of beast fables (ed. in selection, Paris, 1825), and theological works; Vahram of Edessa, historian (ed. Madras, 1810); Johannes Erzingensis, historian, grammarian, theologian, and astronomer fourteenth century, Gregor Datheriensis, theologian. The last great author who wrote in Classical Armenian was Tschamtschean (died 1823), whose most important work was a history of Armenia from the earliest times to 1784 (ed. Venice, 1784–86). The golden ages of Armenian literature are the fifth century and the twelfth century, and the fourteenth century marks the beginning of a steady decline. The first book printed in Armenian was the Psalms (Venice, 1565), and during the seventeenth and eighteenth centuries printing houses were established in many cities in Europe, as well as in Asia—at Julfa, Smyrna, and Madras. A special impetus toward the preservation of Armenian literature was given by the establishment of a college and convent by Mechitar on the island of San Lazaro near Venice in 1717. The *Zeitschrift fur armenische Philologie* was founded at Marburg in 1901.

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**ARMENTIERES,** är'mäN'tyâr'. A town of the department Nord, France, on the Lys, 8 miles from Lille. The town manufactures table linen, cotton goods, and hemp, and has a considerable trade in grain. Pop., 1901, 29,401; 1906, 28,613; 1911, 28,625.

**ARM'FELT,** CHARLES GUSTAVUS (1666–1736). A Swedish general, born in Ingermannland. After serving with distinction in the French armies he returned, in 1700, to his native country, and as commander of the Swedish troops in Finland fought valiantly against the Russians, whose superior strength, however, forced Armfelt to abandon the province in 1714. In 1718 he led a Swedish expedition into Norway, met with ill success, and on the retreat lost almost his entire army through starvation and disease. Subsequently he received his old post of commanding officer of Finland.

**ARMFELT,** GUSTAV MAURITZ (1757–1814). A Swedish courtier whose public life was characterized by striking vicissitudes of fortune. He was born in the government of Åbo. His loyalty to Gustavus III gained him the favor and friendship of that monarch. Armfelt distinguished himself in the war between Sweden and Russia and, as military representative of Gustavus, had the honor of concluding a peace at Wärelä in August, 1790. By the will of Gustavus, who was assassinated in 1792, Armfelt was made Governor of Stockholm and a member of the council assigned to the regent, Charles, Duke of Sudermania. The Duke, however, could not brook the idea of a check being placed upon his liberty of action, and found means to destroy the will, the conditions of which he never intended to observe. Armfelt soon became conscious that his influence was rapidly disappearing. He was rarely permitted to see the young King; and at last, after a secret interview with the Crown Prince Gustavus, departed as Ambassador to Naples in July, 1792. While in Italy he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency and inducing the states to proclaim Gustavus IV of age. The correspondence was discovered. Armfelt fled to Poland and afterward to Russia. He was condemned during his absence for high treason and stripped of his goods and titles, while many of his friends were visited with torture and exile. In 1799 Gustavus IV received the crown at the age of 18, and Armfelt was restored to all his honors. In 1805 he was appointed Governor-General of Finland, in 1806 he commanded the Swedes in Pomerania, and in 1808 he commanded the Swedish army raised for the invasion of Norway; but his plans were so completely frustrated that he was compelled to witness the invasion of Sweden by the successful Norwegians and was in consequence recalled and dismissed by the King. In the following year a revolution took place, Gustavus was deposed, the Duke of Sudermania elected in his place, and Armfelt was appointed President of the Military Council. But shortly after he resigned and retired to Russia, where he lived during the remainder of his life in high honor. The title of Count was conferred on him; he was made chancellor of the University of Åbo, President of the Board of Finnish Affairs, and member of the Russian Senate. He died at Tsarskoye-Selo. Consult Tegnér, *Gustav Mauritz Armfelt* (Stockholm, 1887).

**ARM'GART.** A dramatic poem by George Eliot, published in *Macmillan's Magazine* in July, 1871, and containing a female character of singular strength and fortitude, of the same name.

**ARMIDA,** är-mē'dȧ. A beautiful sorceress in Tasso's *Jerusalem Delivered.* She was employed by Satan to seduce Rinaldo and other crusaders upon their arrival before the Holy City. Lured away by Armida to her pleasure palace, Rinaldo for a time forgets his vows, but is released from the spell by a powerful talisman. He returns to the war, but is followed by the sorceress, who at last rushes into battle against him. She is defeated by Rinaldo, who then declares his love for her, converts her to Christianity, and vows to be her faithful knight. The story of Armida has been made the subject of operas by Lully (1686), Gluck (1777), Cherubini (1784), Zingarelli (1786), and Rossini (1817). Consult Belloni, *Gli epigoni della Gerusalemme liberata* (Padova, 1893).

**AR'MIES** (Fr. *armée*, through ML. *armata*, an armed force, seen in Sp. *armada*, properly fem. of Lat. p.p. *armatus*, from *armare*, to arm). Armed forces, organized under a regular system, for purposes of defense. The term "army" may describe the military strength of the nation of which the force is a part or by which it is employed; but it may also be used to describe an army which is only a part of the military forces of the country to which it belongs, as, for instance, the United States army in the Philippine Islands. The fundamental principle of combat is the same, whether between two individuals or two nations, and out of that principle has developed the art and science of war. From the earliest times when men first joined with one another for warlike purposes, there have been changes and developments in methods of association, discoveries in the realm of strategy and the application of tactics, as well as a constantly increasing number of inventions of weapons, mechanical devices, and other engines of destruction. In a primitive state of society the army as such does not exist, and the fighting force is coequal with the group, the tribe, or the nation. Military service is not only a duty but a privilege, and the right of carrying arms is one of the great distinctions between the freeman and the slave. Citizenship and warriorship as a rule go together; and among the early Germans the attainment of a youth's majority and his admission to a share of political rights was marked by an elaborate ceremony of assumption of arms, which with time passed into the chivalric ritual of admission to knighthood. The closest identification of army and nation is perhaps to be found among nomad tribes, where from time to time the shifting of the entire population is necessitated by failing of pasture. Such a migration, peaceful when unresisted, assumes the character of a hostile invasion when the desired territory is in the possession of a tribe strong enough to attempt resistance. Thus, too, in the great migrations preceding and succeeding the fall of the West Roman Empire, the Germanic warriors, marching from their old homes in the north to the conquest of a new home within the Empire, and accompanied by their wives, their children, and their household goods, offered a complete example of army and nation as one. With the establishment of permanent states the differentiation between citizen and warrior begins, and this development is greatly hastened by the growth of industry; for if the farmer finds it a hardship to be summoned from the plow to the field of battle, the burden falls still heavier on the industrial laborer, with whom the conditions of production are such as to require constant application. The process thus begun continues until, in countries like Great Britain or the United States, where military service is on a contractual basis, the total separation of warrior and citizen is attained. These considerations must be borne in mind in discussing the history of the evolution of the army.

### ANCIENT ARMIES

**Egyptian.** Under the Old and Middle empires (down to about 1900 B.C.) the wars of Egypt were comparatively unimportant. During this period a sort of feudal system prevailed, and the main strength of the army was furnished by the militia of the nomes, commanded by the nomarchs or their deputies, together with the contingents of the great temple estates and of the royal domains. In addition, a certain number of mercenary troops were drawn from the tribes of northern Nubia. Under the twelfth dynasty, and perhaps earlier, there was also a permanent corps, the "Retainers of the King," which seems to have filled the place of a standing army. No cavalry or chariot force existed, as the horse does not appear to have been introduced into Egypt until about 1600 B.C.

The Hyksos wars, which swept away the old feudal system, aroused the military spirit of Egypt, and under the New Empire (from about 1580 B.C.) a standing army was a necessity. It was composed chiefly of barbarian mercenaries, the native troops playing a rather unimportant part. Under the Saitic dynasty (645–525 B.C.), Greek mercenaries were largely employed. The bulk of the army under the New Empire was formed by the infantry, armed with spear and heavy shield or with light buckler and bow. The chariot force constituted the flower of the army. Each chariot contained two soldiers, of whom one fought with his bow and other weapons, while his comrade drove the horses. Great attention was paid to organization and discipline. The troops were divided into regiments and companies, and, in time of war at least, the regiments were formed into brigades or divisions. A special force, called the Mazay, was organized as a gendarmerie, or armed constabulary, but was sometimes employed in war. Consult Erman, *Life in Ancient Egypt*, chap. xx (London and New York, 1894).

**Indian.** Quite extensive descriptions of armies, battle arrays, and warfare among the ancient Hindus are preserved in the *Mahābhārata* or *Iliad* of India, and in the seventh book of the great legal code of Manu. The information which these sources furnish with reference to the constitution of the military force of early India serves to supplement such allusions to armed equipments and fighting as may be gathered from the earlier times represented by the Veda. Among the organizations of an army early recognized in India was a distribution of the forces into nine subdivisions, on the ascending scale, ranging from a squad (Sanskrit *patti*), composed of 1 chariot, 1 elephant, 5 foot soldiers, and 3 horsemen, up to an army corps (Skt. *akṣāuhiṇī*), comprising 21,870 chariots, 21,870 elephants, 109,350 foot soldiers, and 65,610 cavalry. The code of Manu likewise provides for various arrangements for drawing up of the forces in manœuvring, fighting, and encamping. These are interesting for students of military tactics to look up. On the march and in action the King was naturally stationed in the centre for safety; the commander was in the vanguard, unless, through the exigency of the situation, his presence was demanded elsewhere. Details may also be gathered from the sources mentioned with reference to the armor and accoutrement of the soldiers and all matters appertaining to military forces and warfare. The best work on the subject is Hopkins, "Ruling Caste in Ancient India," published in the *Journal of the American Oriental Society*, vol. xiii (New Haven, 1889).

**Persia.** The organization of the Persian army in ancient days appears to have corresponded largely with the divisions introduced into the forces of Media at an earlier date by

King Cyaxares (q.v.), as mentioned by Herodotus (c.103). This general distribution into infantry, composed of spearmen, bowmen, and others, and into cavalry, supplemented by warriors mounted on chariots, prevailed throughout the history of the Persian Empire. The cavalry was the flower of the army, as Persia was ever famous for her horses and her excellence in horsemanship. These mounted forces occupied the wings of the main body. This latter mass was composed of the people and was often little better than an armed mob. The scythe-bearing chariots were drawn up as a division in front of the army, and they seem to have inspired terror into the foe, but were often less effective than the other forces. The use of elephants is found as early as in the campaigns to oppose the invading Alexander. From Herodotus (vii, 61, 84) and other sources we learn that the characteristic equipments of the Persian soldiers were a short straight sword, a long spear, a bow, quiver, battle-axe, mace, or club, and a sling, according to the special district or province from which the levies came. A large wicker shield and a close-fitting leather tunic and trousers, a coat of mail, or a quilted corselet, completed the outfit. The horses as well as the riders were protected by mailed trappings—at least if we can judge from the caparison of the war horses on the sculptures in Sassanian times. A division of the army on the decimal scale of tens, hundreds, thousands, and tens of thousands may be gathered from Herodotus (xii, 81), and seems to be as old as the Avesta. The Persian hosts have ever been proverbial for numbers, and even allowing for exaggeration, the figures must have been enormous. The army which Xerxes led against Greece has been estimated at hardly less than 2,000,000, and Darius is reputed to have opposed the world-conquering Alexander with a force of between 750,000 and 1,000,000 men. The development and history of the Persian army during the Parthian and Sassanian periods, down to the overthrow of the Persian dominion by the Arab conquest and its subsequent results, may be obtained from a study of those times. On Persian armies and armor consult: Jackson, *Classical Studies in Honour of Henry Drisler* (New York, 1894); *Zoroaster the Prophet*, chap. vii (New York, 1899); Spiegel, *Erânische Altertumskunde*, vol. iii, pp. 638 ff. (Leipzig, 1878); Kelsey, *Xenophon's Anabasis, Introduction* (Boston, 1895); G. Rawlinson, *Story of Parthia*, pp. 397 ff. (New York, 1893).

**Greece.** In the Homeric poems the mass of the infantry is of little account, at least to the poet. The fighting is chiefly carried on by the individual heroes, armed with lance and sword, and defended by helmet and shield and sometimes corselet. These heroes go to and from the battlefield in chariots, but in general fight on foot. When the historic period opens, we find that the war chariots have disappeared, and even cavalry, though the arm of the nobles, is not of decisive value. The army is composed of the hoplites, or heavy infantry, armed with helmet, breastplate, greaves, and shield, and carrying a short sword and long spear. These men fought in close formation, usually eight deep, supported at times by cavalry on the wings, and with light troops, armed with javelins, bows, or slings, to skirmish in front and cover the rear. *Lacedæmonian.*—Through the early days of Greek history the Spartan hoplites were regarded as model troops. Their success seems to have been due in part to their rigorous gymnastic training; but still more to a severity of drill such as the other Grecian states seldom required. From the age of 20 to 60 every Spartan could be called upon to serve, though the older men were not called out except in emergencies. This discipline enabled them to change front in the presence of the enemy and held them steady in defeat or victory. *Athenian.*—The Athenian army was a militia. Every man was supposed to receive training and to serve when called upon—the richer as hoplites, the poorer as light-armed troops, while the cavalry was made up from young men of the wealthy families. As the Athenians never spent so much time in drill as the Spartans, they do not seem to have reached their combination of firmness and mobility, though Athenian bravery and skill were shown in many hard battles.

The general formation of the Greek armies remained but little changed for over a century. Marathon, Platæa, and Mycale were fought by the phalanx of hoplites against light-armed Orientals, and the same tactics and the same results are seen in 401 B.C., at the battle of Cunaxa, when the 10,000 Greeks overthrew the Persians opposed to them. *Thebans.*—These had long enjoyed high repute as hoplites; but their contribution to the Greek art of war was rather in the development of a formation in deep column (50 deep at Leuctra, 371 B.C.). This heavy mass was hurled against one wing of the enemy, while the rest of the line, in ordinary formation, was held back to prevent any flank movement upon the attacking column. This innovation contributed largely to the success of Epaminondas and the establishment of Theban supremacy in Greece. *Macedonian.*—Upon these tactics of the Thebans, Philip of Macedon and Alexander the Great developed their armies. The central principle was personal duty to the King on the part of noble and peasant. "Companions" and "Foot-Companions" were the names of the heavy cavalry and infantry. The former wore metal cuirasses and carried lances; the latter had a small shield and a pike about 18 feet in length for the rear ranks. They were drawn up in very close order. In general, Alexander seems to have preferred the old depth of eight men; but under his successors the phalanx was deepened to 16 men, and became an unwieldy mass, formidable on level ground, but easily broken if a rough surface opened up the close ranks. This was shown again and again in the battles between the Romans and the Greeks. An important change in the art of war was the introduction by Philip and Alexander of a charge by heavy cavalry as the decisive feature of the attack, instead of the column of infantry used by Epaminondas. The Macedonians also developed the use of military engines hurling huge stones and arrows, both for siege purposes and also to some extent like modern artillery in actual battle.

**Rome.** While to the Greek belongs the credit of developing warfare into a science, it was left to the Roman legionary, with his perfect discipline and still more perfect organization, to make it effective. The leading characteristic of the Roman soldier was discipline rather than individual prowess. Great national characters like Camillus, Cincinnatus, Papirius Cursor, and Fabius Maximus were not so much heroes or strategists as commanders and disciplinarians.

The fact that the Roman soldier was never the military equal of the Greek hoplite at his best, and that he had no great advantage, man to man, in a pitched battle even with savages, was demonstrated over and over again during his career of world conquest.

In the earliest period of Roman military history all able-bodied citizens, under the King as commander-in-chief, were compelled to serve in the army in time of war. It was under Servius Tullius, however (according to Roman legends, the sixth King of Rome, 578–534 B.C.), that the first real organization took place. On the basis of a property qualification, citizens were divided into classes or grades (*centuriæ*); and each class subdivided into *seniores*, or elderly men, assigned only to light garrison duty, and *juniores*, or effective warriors; with the addition of two *centuriæ* of *fabri* (pioneers), two of *cornicines* (military musicians), and one of *proletarii*. The armies were made up by tribal levies, made in a general public assembly, usually on the Campus Martius, and each tribe was called upon to furnish an equal number of men. Out of a total of 25,000 men there would be 8000 *seniores* and 17,000 *juniores*. The soldiers thus chosen were formed into four legions and a cavalry corps of about 1800 horsemen. The legion (q.v.) on service consisted normally of about 3000 men, not including the *velites*, or lightly armed skirmishers, and a squadron of cavalry. In regular formation the *hastati* (heavily armed infantry), about 1200 strong, and arranged in 10 files, constituted the advance guard; following, was a similar body of *principes*, and a reserve or rear guard of *triarii*, usually arranged in five files.

The equipment of all three divisions was practically identical, and consisted of a short cutting and thrusting sword worn on the right thigh; two javelins, one light and one heavy; metal breastplate, large shield, and brazen helmet and greaves. The Roman attack differed from that of the Greek phalanx, in that, instead of fighting shoulder to shoulder and closing in together as gaps were made, they adopted a loose formation, which permitted the soldiers in the rear to fill up gaps caused by casualties and thus maintained their front intact. In combat the *triarii* used the *pilum*, a short, heavy spear which they threw into the ranks of the enemy before engaging them with the sword. The three divisions of the legion (*hastati, principes*, and *triarii*) were each arranged in 10 companies (*manipuli*), to each of which was assigned a detachment of *velites*. The *manipulus* was under the command of a centurion (*centurio*), whose lieutenant was a junior centurion. In the event of the disablement or absence of the officer commanding the legion, command would devolve on the senior centurion of the first company of the reserve (*triarii*). Normally, the chief command was taken two months at a time by each of the six military tribunes (*tribuni militum*). With the first civil war, however, arose the necessity of a single permanent chief, which arrangement was eventually adopted; a single officer (*legatus*) commanding each legion, assisted by a staff composed of the former military tribunes. The year 276 B.C. witnessed the advent of the professional or paid soldier. The long and heavy wars with Pyrrhus and Carthage led to the formation of a regular army; so that dating from the time of Marius (or from the beginning of the first century B.C.) the enlisted man served for a period of 20 years. The legion, as now arranged, was composed of 6000 men, divided into 10 cohorts of 600 men each, all armed with the *pilum*. The *velites* were replaced by foreign mercenaries, of whom the most famous were *sagittarii* (bowmen) from Crete; *iaculatores* (javelin men) from Mauretania; and *funditores* (slingers) from the Balcares. With the exception of a few Roman *equites*, who held the more important positions, the cavalry also was entirely foreign. Organized into cohorts were auxiliary troops of infantry and cavalry. The next reorganization took place toward the close of the first century B.C. under Augustus, who, besides confirming the period of service as 20 years, also introduced the pensioning of veterans. Twenty-five legions were now established and distributed in different parts of the Empire. Subsequently great changes took place in the army. The typical Roman soldier was no longer the invincible legionary, who, covered by his shield, had fought his way through the most stubborn pikemen, beaten back great hordes of Eastern horsemen, and resisted the wild rushes of impetuous Celts and Germans.

At the beginning of the third century A.D. the work of Augustus and others was beginning to fall to pieces; in the fourth, it was scarcely anywhere in evidence, and by the end of the fifth it had become a thing of the past. The exigencies of border warfare, with the extended system of permanent camps connected by patrols, had developed cavalry and light infantry at the expense of the older legion. In the third century A.D. the elaborate system of frontier defense and interior garrisons broke down, and the Empire was subjected to both civil war and foreign invasion. While the legions were engaged in civil strife, the opportunity of the enemy arrived. The frontiers were simultaneously attacked, and the Empire reeled under the shock. The Persians were rising to power in the East (226 A.D.); the German tribes were confederating and becoming correspondingly formidable; and the Franks, Alemanni, and Goths appeared along the Rhine and the Danube. Diocletian, however, with the reconquest of Britain in 297 A.D., restored the Empire to a semblance of its former power and unity. With the aid of wholesale taxation he replenished the exchequer and regarrisoned the military frontier. The changes and additions brought about by Diocletian are remarkable for the value he placed on the troops of mixed nationality and for the growing neglect of the ancient Roman legion. He also enlisted many new bodies of horsemen; *cunei, alæ, vexillationes*, etc., being raised alike for the limitary, the comitatensian, and the Palatine armies, among whom Germans, Moors, and Persians were more numerous than the born subjects of the Empire. Under Constantine, the old legionary cavalry disappeared altogether, and cavalry and infantry became separate commands; yet under him and his successors, though cavalry grew considerably in relative importance, the infantry still remained the more important arm. The decadence in physique and *morale* of the Roman army at this time was largely due to the fact that the corps were less homogeneous, and the substitutes and recruits bought by the land-holding classes were often of bad material. The increasing boldness of their foes and the constant civil and internal dissensions had a baleful effect on the old-time

*esprit-de-corps* of the rank and file, and, together with the growing luxury and increasingly enervating vice of the times, soon brought about the disintegration and decay of the magnificent Empire. It is interesting to note that in many instances modern conditions have compelled the adoption of units of military command and forms of military procedure strikingly similar to those of the Romans; while the legionaries' sword, after passing through the radical forms and changes of the Middle Ages, has again appeared in the shape of the modern infantry sword-bayonet, which in shape and size closely resembles the Roman sword.

MODERN ARMIES

The evolution of the modern army has been along the lines of national and mechanical development, national needs and aspirations dictating its origin, organization, and strength, and the progress of mechanical invention its tactics and equipment. Mediæval armies, whose organization and characteristics will be found discussed under FEUDALISM, were made up chiefly of the retainers, dependents, and followers of the nobility, and were usually employed in the petty struggles of their leaders, or in assisting the King to make war on a larger scale. The success of the King invariably meant gifts of land to the victorious nobles fighting under his banner; who, in turn, rewarded their knights and squires by smaller gifts of land, or land privileges, thus building up the feudal system. The holding of lands implied service due to the giver, and as a consequence many of the nobility vied with their King in power and prestige. The crusades did much to develop the idea of coöperation; but at the best the different armies participating were practically independent of each other. It was an age when science was unknown, and the want of intellectual occupation made war the favorite occupation of the higher classes. Individual prowess and bravery were the standards by which battles were fought and won, the fate of a battle frequently depending on a personal combat between two knights. Under such circumstances, the science of war could never attain a high degree of efficiency; nor could any general organization be effected.

It was not until the reign of Charles VII of France that any regular attempt at organizing a standing army was made, although the Turkish janizaries (q.v.) had been in existence for almost a century before. The Swiss mercenaries, bodies of professional soldiery, were in great demand during the Middle Ages, their military qualities often successfully deciding the issue of a battle. The employment of mercenaries consequently soon became general; so much so, that voluntary patriotic service ceased altogether. Widespread dissatisfaction, however, soon developed, owing to the heavy expense involved, and the danger of intrusting the safety of the State to hired foreigners, who, recruited from the very dregs of society, had to be kept under the strictest discipline and surveillance. It followed as a natural result that organization and the consequent sinking of the individual in the mass eradicated the older forms of knighthood, with their attendant feats of arms and examples of personal skill and daring.

In the reaction from the burden and expense of mercenary armies the present European Continental military system had its inception. The use of firearms by this time had become more general, the proportion of musketeers in the various armies between the beginning of the sixteenth and the end of the eighteenth centuries had considerably increased, and the pike was superseded by the bayonet. Changes of weapons naturally influenced and brought about a change in tactics. In the Thirty Years' War (1618–48), Gustavus Adolphus and Wallenstein employed directly opposite infantry formations. (See INFANTRY.) The former arranged his men six ranks in depth and gained corresponding length of line. Wallenstein, on the other hand, used a narrower front by placing his men in from 20 to 30 ranks. The gradual thinning down to the famous "thin red line" made historic by the English, who have always used the line in preference to the mass of columns of their opponents, and from that to the widely extended front rendered necessary by modern rapid and long-range firearms, is a matter of comparatively recent military history. In the reign of Louis XIV of France (1643–1715) the grouping of brigades and divisions was first introduced, and in the next century Frederick the Great of Prussia (1740–86) reduced his infantry formation to three ranks and introduced a most rigid and exact system of drill and discipline. He was also the originator of horse artillery (1759). (See ARTILLERY.) The contest waged by France against Europe from 1792 to 1797, together with her terrible internal warfare, had largely exhausted the tremendous levies which had hitherto supplied her armies, and in 1798 a law was passed establishing compulsory military service. (See CONSCRIPTION.) This compelled all continental Europe to follow Napoleon's example, so that to-day voluntary enlistment in Europe survives in England alone. Not only conscription, but the development of modern systems of national finance whereby large sums of money could be raised by loans had its effect on European armies. The placing of the entire credit of a State for the support of its military forces enabled armies of greater size to be maintained for a threatened emergency, and these too could be increased far more rapidly and to a much greater degree than was possible when merely the actual wealth of the treasury itself was concerned. In other words, by conscription and loans large armies could be raised speedily and maintained so that the commander-in-chief was relieved of the necessity of thinking of the strength of his forces and the means and methods for their supply and support. This made the European army of the nineteenth century a far more mobile force, for it was relieved from the necessity of subsisting on an enemy's country, by an elaborate system of supply from a home base which the additional funds provided. With this increased mobility naturally followed more elaborate organization and perfection of methods, so that to an extent never before logistics shared with strategy and tactics in the planning of military operations. Furthermore, with the later development of railways even greater ability to mobilize the army rapidly was presented, and this, too, had its effect on the strategy and organization so that the forces were arranged to be placed at the theatre of war much earlier and in much greater strength than in former days. Accordingly, in the nineteenth century the organization and operation of an army were

governed by more vigorous strategy and tactics. The employment of larger forces under the control of an individual took the place of the wider distribution that had previously ruled, and the large army, in turn, was made possible by the new system of conscription or universal service in place of the systems of recruiting which had hitherto prevailed, where desertion and the necessity of maintaining smaller units more closely controlled were factors. Furthermore, the composition of European armies became changed under the new conditions of the nineteenth century, for with conscription and universal service the well-drilled veteran of the eighteenth century, often a professional soldier for life, whose presence in the ranks made possible the older line tactics, disappeared and his place was taken by the young man serving for the stated time. Experience now counted for little with the rank and file, but experience and study of contemporary problems were everything for the officers. In case of war, the standing army was augmented by men of previous military experience obtained from the reserve or militia. More truly than ever, the armies of Europe were now national forces, and while the recruits lacked experience, there was a corresponding increase in patriotism and loyalty, as the hired foreigner of the previous century was eliminated in favor of the young peasant serving with the colors, often with the companions of his home district, for army corps arrayed on a territorial basis. These larger armies and their changed composition also had their effect on the tactics of the day, which were further influenced by the development of high-power arms and other technological advances. The line of battle had given place to the formation of the army in column, and now this was changed by the distribution of part of the forces in the form of skirmishers. The older rules of strategy and tactics governing military operations became disregarded, and the lesson of Napoleon that the main object was the destruction of the enemy's army and that the battle is the end to be sought, governed in the organization and training as well as the actual use of armies. The increase in the national feeling manifested throughout Europe led to the formation of standing armies, not merely for the aggression of a monarch, but for purposes of defense, and the desire for national strength had the support or, at least, the consent of the people. Accordingly, a field army was maintained organized for immediate use, but it was followed by a land militia with retired soldiers as drill masters and leaders of recruits. Such a militia, while requiring a small amount of time from the ordinary occupations of the citizens, made possible a military force of large dimensions in times of war. Again, reserve forces were organized so that the losses in the field could be made up and the commander-in-chief no longer had the worry of seeing his forces depleted. Thus, in the Franco-Prussian war of 1870, drafts of 2000 officers and 220,000 men were sent out to make good the loss suffered by the Prussian army in one way or another as the campaign progressed.

Such conditions as the foregoing were reflected both in the composition and use of armies and in their organization. Napoleon stated that tactics should be altered every ten years with the change of conditions, and the same consideration applies in a large degree to all schemes of national defense which are reflected in the organization of the army. This will be found discussed under ARMY ORGANIZATION, while the present composition of the forces of the great powers is treated under the section *Army* of the articles on the foreign countries. As to the employment of an army, the reader is recommended particularly to the articles on STRATEGY and TACTICS, MILITARY.

**Bibliography.** Authorities and statistical reports from which much valuable information on armies may be obtained are: Oman, *Art of War in the Middle Ages* (London, 1885); Jerram, *Armies of the World* (London and New York, 1900); and the *Reports of the Military Information Division* of the War Department, issued by the Government Printing Office at Washington, D. C. The annual issue of the *Statesman's Year Book* (London and New York) contains the latest reliable statistics regarding the armies of the world. Other sources of information are the regular service magazines, and the *Journal of the Military Service Institution* (Governor's Island, N. Y.). For a further treatment of the subject of armies and detailed information as to their organization and principal characteristics, the reader is referred to the articles, ARMY ORGANIZATION; ARTILLERY; CAVALRY; INFANTRY; FRONTIER, MILITARY; LANDWEHR; MILITIA; MILITARY EDUCATION; MOBILIZATION; TACTICS, MILITARY; VOLUNTEER, MILITARY. Detailed information on military technical subjects will be found under AMMUNITION; BALLISTICS; ENGINEERING, MILITARY; COAST DEFENSE; FORTIFICATION; FIELD ARTILLERY; ORDNANCE; SIGNALING AND TELEGRAPHING, MILITARY; SMALL ARMS; and also under numerous titles relating to military matters in general. In addition to the special article on TACTICS, MILITARY, such specific operations as ADVANCE GUARD; ATTACK; BATTLE; ENGAGEMENT, MILITARY; INSPECTION; PATROL; MARCHING; REAR GUARD; OUTPOST, will be found under their respective titles.

**AR'MILLARY SPHERE** (Lat. *armilla*, a ring). An instrument intended to give a just conception of the constitution of the heavens and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal imaginary circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahe making most of his planetary observations with the help of such an instrument. The armillary sphere can now be used only for instruction in astronomy, and even in this respect it is altogether supplanted by the celestial globe.

**AR'MIN,** ROBERT. An English actor and writer. He is spoken of in *Pierce's Supererogation* as one of the "common pamphleteers of London," but he is chiefly remarkable as having been one of the original actors in Jonson's *Alchemist*. He created the part of Dogberry. He is the author of *A Nest of Ninnies*, published in 1608.

**ARMIN'IAN, or GENERAL, BAP'TISTS.** See BAPTISTS.

**ARMIN'IANISM.** The name given to a school of Protestant theology which arose in the Netherlands toward the close of the sixteenth

century, taking the name of the leading early representative, Jacob Arminius (q.v.). It consisted at first of a protest against the strict predestinarian doctrine of Calvin and Beza (see CALVINISM), but developed gradually into an increasing liberal theology. The accepted teachers of the Reformed church, at the time the Arminian movement began, emphasized the importance of unconditional election and a limited atonement. Against these views objection was raised in 1578, when Koornheert, a *secretarius* of Haarlem, began his agitation to secure a simpler doctrinal system. Arminius, who was the most influential preacher in Amsterdam from the year 1588 on, was called upon to refute Koornheert's alleged errors; but while studying the question became himself infected by them. Thus gradually he adopted views at variance with the Calvinistic doctrines named above, and began to teach that God, who knows beforehand how all men will act, decrees their salvation or condemnation accordingly; in other words, that election is conditional. He further taught the universality of the atonement—that is, that Christ offered a sufficient sacrifice for all mankind, although it becomes efficient only for such as have faith and believe in Him. (This should be distinguished from modern Universalism, q.v.)

After the death of Arminius (1609), his followers, to the number of 46, presented to the Estates of Holland and West Friesland a "Remonstrance," drawn up by one Uytenbogaert, embodying a moderate statement of their views under five articles, which they declared to be "agreeable to the Word of God" and "sufficient for salvation." These articles were substantially as follows: 1. Predestination depends upon God's foreknowledge. 2. The atonement is universal in the sense that all men are salvable. 3. No one can exercise saving faith until regenerated by the Holy Spirit. 4. It is possible to resist the operation of divine grace. 5. It is not certain that all who seem to be called will persevere unto the end. The publication of this remonstrance was met by a "Counter-Remonstrance" from the Orthodox side, setting forth in five articles the high Calvinism which most of the Dutch churches agreed in maintaining. From these two documents the progressive and conservative parties came to be known as "Remonstrants" and "Counter-Remonstrants," respectively, and from the number of articles in dispute, the struggle is sometimes called the "Quinquarticular" controversy. In the vain hope of reconciliation, conferences were arranged at The Hague (1611) and at Delft (1613), but without result. The toleration law, issued by the States-General in 1614, was no more successful. It had become clear by this time that the theological question was inextricably interwoven with politics. Hugo Grotius, scholar and diplomatist, and John van Olden Barneveldt, Advocate-General of Holland, sided with the Arminians, who supported their republican policy; while the Stadtholder, Prince Maurice, favored the Calvinists, who in turn gave their support to his party of political centralization. No decision upon the doctrinal questions at issue was reached before the meeting of the national synod at Dordrecht (Dort) in 1618.

The Synod of Dort (November, 1618, to May, 1619) is one of the most important councils in the history of the Reformed church. It bears an international stamp, having been attended by delegates sent from England, Switzerland, the German States of the Palatinate, Hesse, and Bremen. King James, of England, was personally represented by John Hales, "the ever-memorable," and an interesting incident of the synod was this man's change of view, when he "forever bade John Calvin good-night." The two opposing parties were led by Gomarus, a Calvinist, and Simon Episcopius, an Arminian. The Orthodox members were largely in the majority, and it soon appeared that the Liberals were there merely to be tried, not to deliberate and consult in equal debate. Episcopius and 13 other Remonstrants were condemned as heretics and excluded from the synod, which then proceeded to formulate the true faith in a series of decrees, afterwards confirmed by the States-General. Episcopius himself was banished, and some 200 Arminian pastors were deposed. Proceedings were begun by the civil government against the political leaders who sided with the Remonstrants. Barneveldt had already been executed before the adjournment of the synod. Grotius was condemned to life imprisonment, but escaped after about two years' confinement. The doctrinal decrees of Dort were accepted by the churches in Holland and in France, but they met with some opposition elsewhere. They are still the official standard of the Reformed Dutch church in America.

After the death of Maurice (1625) the severity of the laws against Arminianism was relaxed, and Episcopius was allowed to return from his exile. The closing years of his life were spent in teaching theology at the new Remonstrant college in Amsterdam (founded in 1630). His successor here was a French theologian, Courcelles, who died in 1659. There followed in turn three eminent Arminian scholars, Limborch (d.1712), Le Clerc (d.1736), and Wetstein (d.1754). Wetstein is noted for his contribution to the cause of biblical criticism, especially for his work upon the text of the New Testament. Arminianism has continued in Holland down to our time, though without any large numerical following. There are Remonstrant churches in Rotterdam and Amsterdam. The movement put forth its best energy in the period of controversy, upon which, as has frequently been remarked, it seems to have thriven better than upon peace. In this respect it shares the fate of most movements that are based upon protests against some real or fancied grievance. During the eighteenth century not a few Arminians went over to the Socinian or Arian position, discarding more and more of the Reformed system of belief. But, aside from this radicalism, the Arminian influence has been widespread. It passed over into England, and, from the time of Archbishop Laud, controlled the theology of the Established church, leaving Calvinism to the non-Conformists. It took on new life in the time of Wesley, and, with some modifications, became the theology of Methodism. It is substantially the faith of many Protestants, of other names, who suppose themselves to be Calvinistic. Indeed, it would be a mistake to think of Arminianism as an isolated phenomenon, for it is akin to the teaching of some of the early Greek theologians, to the semi-Pelagianism of the fifth century, and to some views imputed to Erasmus. Protestants in general shared in the controversy on the doctrines of Arminianism, and all opponents of Calvinism are still often characterized as Arminians.

Consult: *The Works of Arminius*, Eng. trans., reprinted from the Eng. ed., 2 vols. (Buffalo, 1853); Calder, *Memoirs of Episcopius* (New York, 1837); Scott, *The Synod of Dort* (Philadelphia, 1841); Schaff, *Creeds of Christendom*, especially vol. i, pp. 508–23, and vol. iii, pp. 545–97 (New York, 1877); Motley, *John of Barneveld* (New York, 1874); Blok, *History of the People of the Netherlands*, part iii, Eng. trans. by Putnam (New York, 1900); Dresbach, *Die protestantischen Sekten der Gegenwart* (Barmen, 1888). See also DORT, SYNOD OF.

**ARMINIUS** (17 B.C.–c.21 A.D.). A chief of the Cherusci, a German tribe inhabiting parts of what is now Hanover and Brunswick. In his early years he served in the Roman army. The period of Arminius's youth was a time of great peril for Germany. To secure the frontiers of the Empire against the attacks of the Teutonic tribes, the Romans had advanced into the more turbulent districts and erected a series of strong fortresses. Between 9 B.C. and 4 A.D. Drusus and Tiberius penetrated into the northwest of Germany as far as the Elbe and reduced the various tribes to virtual subjection. With so much prudence and caution, however, had Tiberius proceeded, that the Germans continued to all appearance on the best terms with the Romans, gradually adopted Roman habits, and frequently took service in the Roman armies. Arminius and his brother Flavius enrolled themselves under the Roman standards, and as leaders of Cheruscan auxiliaries not only obtained Roman citizenship and the rank of knighthood, but likewise acquired a knowledge of the Latin language, and an insight into the arts of war and policy, as practiced by the Romans. On returning home, about 7 A.D., Arminius found his people oppressed by the Roman Viceroy, Quinctilius Varus, and conceived the plan of delivering his country from the Romans. All the tribes and leaders as far as the Elbe were secretly united; Varus was lulled into security and induced to scatter most of his forces, and with the remaining portion, over three legions, which was just on the point of leaving the territory of the Cherusci for the Rhine, to quit the highway for a shorter route across the country. He was thus lured into the impassable districts of the Teutoburg Forest, perhaps between the towns of Detmold and Wiederbruck, near the sources of the Ems and the Weser. Arminius, who commanded the rear guard of the Roman army, fell upon the legions unexpectedly, and annihilated the entire force, 9 A.D. When intelligence of the disaster reached Rome, it excited the greatest consternation; but the Germans carried their victory no farther, and for a few years both parties refrained from hostilities. In 15 A.D., however, the Romans pressed once more into Germany. In two successive campaigns, 15 and 16 A.D., Germanicus reduced Arminius to great straits and took his wife, Thusnelda, captive, but was recalled to Rome by the Emperor Tiberius, 17 A.D., and the results of his victories were lost. (See GERMANICUS CÆSAR.) From this time no Roman army ever ventured to penetrate into the interior of Germany. After the expulsion of the Romans internal feuds broke out with great violence among the Teutonic tribes. In the course of these Arminius was slain by his own relatives about 21 A.D. Tacitus says of him (*Annals*, ii, 88): "Arminius fought with vicissitudes of fortune, and fell at last by the treachery of his own relations; a man of warlike genius, and beyond all question the deliverer of Germany." A colossal statue of Arminius by Bandel was erected on a hill near the town of Detmold in 1875.

Consult: Meyer, *Untersuchungen über die Schlacht im Teutoburger Walde* (1893), Kemmer, *Arminius* (Leipzig, 1893), and Fischer, *Armin und die Römer* (Halle, 1893).

**ARMINIUS, JACOBUS** or **JACOB HARMENSEN**, commonly called ARMINIUS (1560–1609). One of the most influential of the Dutch theologians of the Reformed church, and founder of the theological system which bears his name. He was born in Oudewater-an-der-Yssel, Oct. 10, 1560, and died in Leyden, Oct. 19, 1609. His father, a cutler by trade, died when Jacob was a child, and the boy was brought up by friends in Utrecht and Marburg. He spent several years (1575–82) at the newly founded University of Leyden, where he imbibed a distaste for the Aristotelian philosophy, which still had great power. Proceeding to Geneva, the Mecca of the Reformed church, Arminius studied for nearly six years under Beza (1582–87), with the interruption of a few months' stay in Basel (1583), where he heard Grynæus, who became very fond of his gifted pupil. In Basel Arminius delivered some lectures on his own account, as was the custom with especially promising students, and he would have been rewarded with the degree of doctor had he not modestly declared himself too young to receive this distinction. At the close of his period of study Arminius made a trip to Italy, visiting Padua and Rome (1587). During most of his student life he had been supported by the city of Amsterdam, which recognized his promise and, knowing him to be dependent, had extended to him a sort of municipal patronage.

In 1588 Arminius became preacher of the Reformed church in Amsterdam, where he remained for 15 years, with growing fame and influence. His orthodoxy was as unquestioned as his ability, and we find that appeal was several times made to him to defend the Calvinistic system against attacks. In its influence upon Arminius himself the most important of these controversies was with one Koornheert, of Haarlem, who had attacked Calvin's doctrine of predestination. While studying the question, Arminius began to incline toward similar views himself, and this tendency appeared in his public sermons on St. Paul's Epistle to the Romans, especially chaps. vii.–ix. Yet he always maintained that his opinions were not inconsistent with the doctrinal standards of his church, the Belgic Confession, and the Heidelberg Catechism. In spite of some opposition on the part of the conservatives, Arminius, in 1603, was appointed professor at the University of Leyden, the great training school for ministers of the Reformed church in Holland. His colleague, Gomarus (q.v.), was a stanch Calvinist, and controversy soon broke out between them, which continued throughout the remainder of Arminius's life. This was by no means a mere academic dispute, but rather one in which the whole of Dutch Protestantism was engaged. The chief points on which Arminius differed from the orthodox majority were the doctrines of divine grace and of election. Arminius taught that grace was universal and election conditional. Gomarus taught that grace was confined to the elect, and that their election was not dependent upon God's foreknowledge of their

faith or good works, but was merely from God's good pleasure. Disputations were held, but without result. Arminius was charged with holding Pelagian and Socinian views, which latter charge he denied with especial vigor. His position at the university remained secure, for the authorities declined to permit clerical interference. Nevertheless, he was constantly under fire, and repeated attempts were made to bring him to trial before a synod. The struggle was still going on when Arminius died, worn out by the strain of theological strife. His influence, however, was never greater than after his death, and his followers under the leadership of his pupil Episcopius (q.v.), prolonged the struggle, even through temporary defeat at the Synod of Dort, until religious toleration was secured under Prince Frederick Henry. The details may be found under ARMINIANISM.

The works of Arminius are accessible in Latin and English. Consult: *J. Arminii Opera Theologica* (Leyden, 1629); *The Works of Arminius*, Eng. trans., reprinted from the London ed. (Buffalo, 1853). There is a life by Nichols (London, 1843).

**AR'MISTEAD,** GEORGE (c.1780–1818). An American soldier, born at New Market, Va. He entered the United States army as second lieutenant in 1799, became a captain in November, 1806, and a major in March, 1813. He was conspicuous for gallantry at the capture of Fort George (Canada), on May 27, 1813, and subsequently distinguished himself and earned the brevet rank of lieutenant-colonel by his defense of Fort McHenry (near Baltimore) against the attack of Admiral Cochrane's fleet, on Sept. 13, 1814.

**AR'MISTICE** (Fr. *armistice*, from Lat. *arma*, arms + *statum*, supine of *stare*, to stand; for the form *stice*, cf. sol-*stice*). A cessation of hostilities for any period of time that may be mutually agreed upon by the combatants. An armistice is sometimes called after a severe action, to enable both sides to search for and bury their dead; or it may be called as a prelude to overtures for peace. A local armistice may be entered into or arranged between any part of the opposing forces which will only affect the respective commands. A general armistice, affecting all the troops in the field and all operations, can only be entered into by the commanders-in-chief, or their home governments. The term "armistice" is also applied to an opportunity given to rebellious citizens or subjects of a state to present themselves, surrendering their arms and renewing professions of loyalty to the state, immunity from punishment for acts against the state done while in rebellion being guaranteed all who accept the terms of the armistice. See INTERNATIONAL LAW; WAR.

**AR'MITAGE,** EDWARD (1817–96). An English historical painter. He was born in London; was educated in Germany and France and was a pupil, in 1837, of Delaroche, whom he assisted in painting the famous Hémicycle in the Ecole des Beaux-Arts. His more noteworthy frescoes are in St. John's (Roman Catholic) Church, Islington, London, and in the Houses of Parliament. He was appointed professor of painting in the Royal Academy in 1875, of which he had become a member three years earlier. His *Lectures on Painting*, delivered to the students of the Royal Academy, were published in 1883. His influence contributed not a little to the revival of fresco painting in England and was always directed in favor of a grand and lofty, if somewhat cold and severe, style. A volume of his *Pictures and Drawings* appeared in 1898.

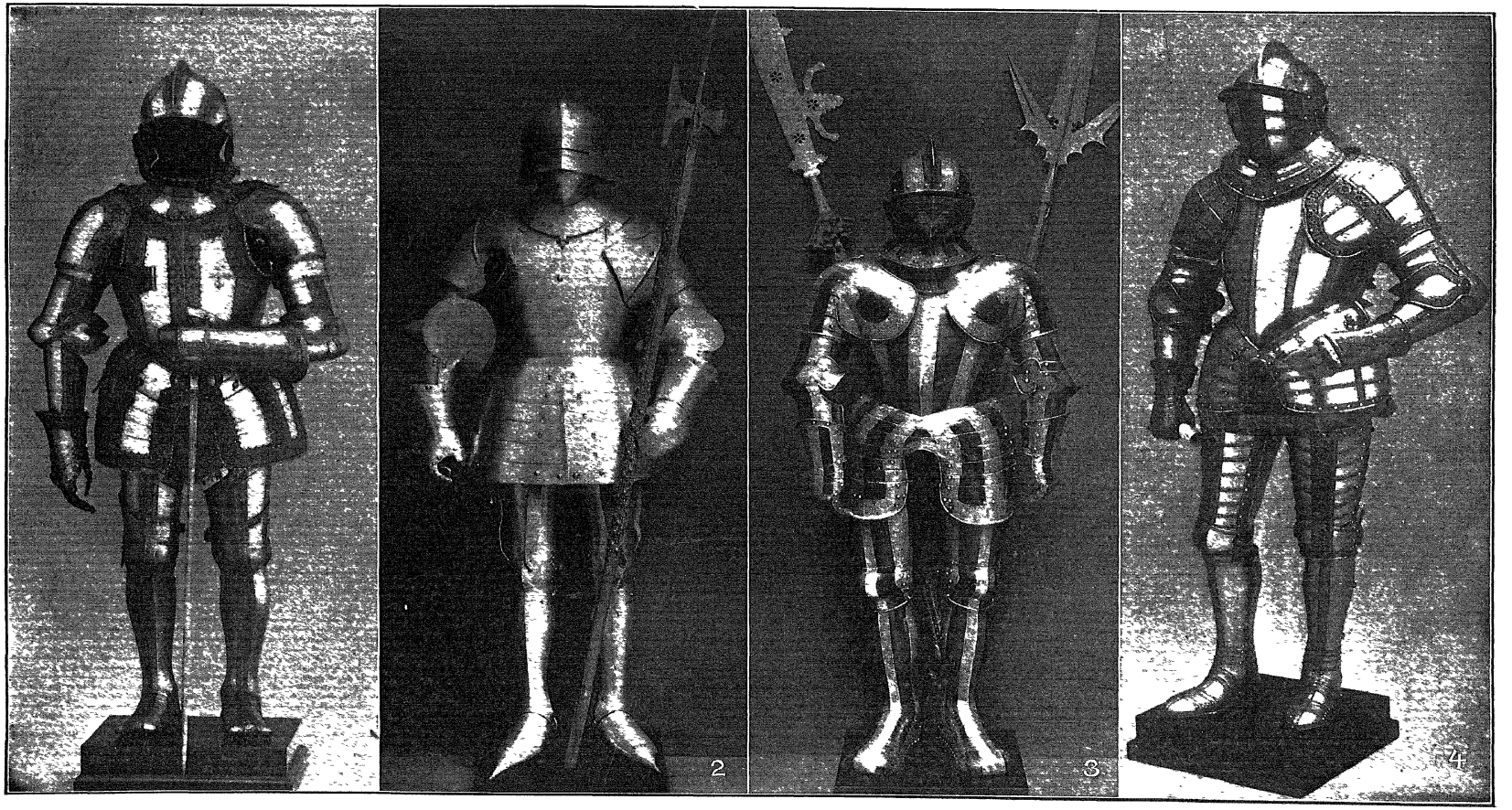
**ARMITAGE,** THOMAS (1819–96). An American Baptist clergyman who was born in Yorkshire, England, and came to America in 1838. At 16 years of age he entered the ministry of the Methodist Episcopal church, but in 1848 became a Baptist, and was pastor of the Fifth Avenue Baptist Church, New York, retiring in 1889. He was active in the organization of the American Bible Union, and was its president from 1856 to 1875. He was a strong advocate of the revision of the Bible, with a view to bringing out what he thought the correct interpretation of the words which relate to baptism. He published *Preaching: Its Ideal and Inner Life* (1880)—lectures which he had delivered before Baptist theological seminaries—and *A History of the Baptists* (1886).

**AR'MOR** (through OF. *armure*, *armeüre*, from Lat. *armatura*, armor). In common usage, clothing or coverings worn to protect the body against weapons. (In the English statutes it includes offensive weapons as well.) Among primitive nations the armor ordinarily consisted of the shield alone. Before gunpowder was commonly used, each nation, as it gained greater skill in warfare, adopted other means of defense, in addition to the shield. Skins, leathers, various materials like cloth, metals in many forms, were adopted as protections. The Greeks of the Homeric Age had helmets, cuirasses, greaves, and shields of bronze. The later Greeks used the same pieces of bronze armor, but developed them so as to protect the whole body more thoroughly, and frequently used a corselet of quilted linen, of Oriental origin, in place of the metal cuirass. The shield was smaller than the Homeric shields. The Romans used practically the same armor, but endeavored to develop it along the lines of superior protection and less weight. For part of the body armor they substituted iron in place of bronze. For the cuirass they used frequently leather, on which iron rings were sewed. The shield was of wood, covered with leather, and had a metal rim.

The early Germans had no armor except the shield. From contact with Roman weapons, they learned the necessity for more, and accordingly adopted some of the Roman armor. But for a long period armor was rare and costly. Charles the Great enacted laws repeatedly forbidding the sale of byrnies (q.v.) outside his realm. If any merchant disobeyed, he was to forfeit all his property. Every large landowner had to own a byrnie; and if he appeared without it, he forfeited his benefice. As, in place of national levies, feudal armies became the rule, more stress was laid upon a knight's having a complete suit of armor. The foot soldiers and attendants were protected mainly by gambesons, but the knight strove to cover every portion of his body with metal armor.

The period beginning with the twelfth century, when the use of the crossbow became common and when the crusaders came into conflict with the armies of the East, is the time in which armor developed most rapidly and became most perfect. For the byrnie was substituted, first, the grand hauberk, and later, in the fourteenth century, plate armor. The small, conical-shaped helmet of the eleventh century was discarded for a much larger one, cylindrical in form, which

# ARMOR




SPECIMENS OF EUROPEAN ARMOR FROM THE COLLECTION OF THE METROPOLITAN MUSEUM OF ART, NEW YORK CITY

1. SPANISH ARMOR, END OF SIXTEENTH CENTURY
2. ITALIAN ARMOR, ABOUT 1460
3. GERMAN ARMOR, 1600
4. ENGLISH ARMOR, SIXTEENTH CENTURY

covered both head and face. When the visor was down, only a few openings were left for seeing and for getting air. The body also was entirely covered with plate armor. When thus clad a knight was unrecognizable, and this necessitated armorial bearings as a means of identification. The shields were still made of wood, and elm seems to have been preferred. In thoroughly equipped bands of mounted men the horses were also partially protected by plates of armor.

Armor, by its development, had been able to keep pace with the improved forms of the crossbow and the longbow. But when gunpowder came into use, armor was of little service. Consequently it was discarded for the most part, except among the very wealthy, who continued to wear coats of mail as late as the close of the seventeenth century, and in certain troops of cuirassiers, some of which still retain in their uniforms traces of armor. Even now some of the helmets worn by cavalry may be classed as armor. After coats of mail were discarded because they were ineffective and cumbrous, buff coats and jerkins were much used for defense.

For this whole subject consult Demmin, *Die Kriegswaffen* (4th ed., Leipzig, 1898), which contains thousands of illustrations, and Ashdown, *Arms and Armor* (New York, 1909). For the separate pieces of armor see AILETTES; BARD; BRASSARTS; BREASTPLATE; BRIGANTINE; BYRNIE; CHAMFRON; CHAUSSES; COAT OF MAIL; COIF; GAMBESON; ETC. See also CHAIN MAIL.

**AR'MORER.** Formerly a maker of, or an expert in, armor; hence one who had the care of the arms and armor of a knight or man-at-arms and equipped him for action. In modern use an armorer is a manufacturer of military arms, or one who has the supervision of any collection or equipment of arms. In the British Army an armorer is attached to each troop of cavalry and to each company of infantry to clean the arms. Aboard a man-of-war the armorer and armorer's mate did the blacksmith work of the vessel, but of late years the armorer is a petty officer and one of the gunner's gang, his duties being the care of the arms used by the ship's company. Aboard ship each man is not responsible for the care of his weapon, as is the case with soldiers.

**ARMOR'ICA,** corrupted from **AREMORICA** (Celt. *ar,* on or near + *mor,* sea, Lat. *mare,* Slav. *more;* cf. *Pomerania,* Slav., coastland, and *Paramaribo,* the dwelling near the sea). The country of the Aremorici, the name by which the people occupying the coast of Gaul between the Seine and the Loire were known to Cæsar. At a later period the name Armorica was confined to the country afterward styled Britannia Minor, or Bretagne.

**ARMOR'IC LAN'GUAGE.** See CELTIC LANGUAGE.

**AR'MOR PLATE.** The protection of vessels of war by metallic plating began soon after the introduction of heavy guns on board ship, but was a matter of little importance until the introduction of shell fire and the increased power of guns made the protection afforded by thick wooden sides wholly inadequate. The demand for armor became more imperative as time went on, owing to the greater use of machinery and apparatus which needed protection, even against comparatively small guns; and, in recent years, its use has been further stimulated by the increased speed of fire of guns of all calibres. The first important use of armor plate was made in the operations against Gibraltar in 1782. The Chevalier d'Arçon had caused to be constructed 10 floating batteries of 600 to 1200 tons, armed with 10 to 20 guns each. The hulls were of wood, protected with bars of iron laid on at short intervals, with an outer covering of cork. Sand was placed in the spaces between the bars, and it was to be kept wet to avoid danger of fire from red-hot shot. The deck over the guns was of very solid construction and covered with thick green hides. At the attack on Gibraltar of Sept. 13, 1782, one of the vessels took fire, and, as they were moored very close together, the conflagration spread to the others, and they were all destroyed. No provision had been made for extinguishing fire, as it was thought the means to prevent it were ample. Boats, even, were not supplied, so that of the 5260 men who formed the crews, only 487 were saved. Subsequent to this were many suggestions as to the employment of armor plating. About 1812 Col. John Stevens, of New Jersey, prepared plans for an armored steam vessel for harbor defense. Explosive shells, which had hitherto been used only in mortars, were in 1824 prepared for service in the ordinary smoothbore guns of the French ships; and at that time General Paixhans, in an official letter to the French government, predicted that this new departure would force the creation of armored ships. About 1830 the French government began experiments (the first were carried out at Metz) to determine the resistance of earth, wood, and different types of masonry to the penetration of spherical projectiles. These experiments were continued at intervals for several years, and the results obtained are still considered of some value.

In 1841 General Paixhans, who invented the shell for low-angle fire, recommended the application of armor plate to the sides of vessels as a protection against his own missiles. His plans were rejected, but they attracted much attention. In 1841, also, the sons of Col. John Stevens proposed to the United States Navy Department to build an ironclad steamer of high speed, in which all of the machinery, including the propellers, was to be below the water-line. The proposal was accepted, and the act of Congress, approved April 14, 1842, authorized the Secretary of the Navy to "contract for the construction of a war steamer, shot and shell proof, to be built principally of iron, upon the plan of the said Stevens." The Stevens brothers had been carrying on armor experiments of their own, and as a result of them had decided that a thickness of 4.5 inches would be sufficient to render the new vessel invulnerable. Just as the Stevens ship was about to be constructed the performances of John Ericsson's large wrought-iron gun showed that 4.5 inches of laminated armor was insufficient for the purpose in view, so that when the Stevens battery was finally begun in 1854—two months before any armored craft in Europe had been laid down—it was as a larger vessel than that originally designed, in order to carry armor of 6.75 inches. The Stevens battery was never completed, largely because general interest in the project subsided, but specifically because Congress refused further appropriations.

In 1841 Theodore R. Timby submitted to the United States War Department plans for a revolving armor-plated battery, and in 1843 he

filed a caveat for "a metallic revolving fort, to be used on land or water, and to be revolved by propelling engines located within the same and acting upon suitable machinery." In 1845 M. Dupuy de Lôme submitted the plans of an iron-hulled armor-plated frigate. He believed that by substituting iron for wood he could reduce the weight of the hull from 42 per cent of the displacement to 23, and this saving would be sufficient to give the ship an armor belt 8 feet wide and 6.5 inches thick. The plans were rejected on the ground that he had overestimated the weight which would be saved; that, even if the proposals were feasible, a 6.5-inch belt was not invulnerable, and that, moreover, the battery was left without protection. In 1846 the French constructors were called upon for plans of an armored floating battery for coast defense. One of these provided for an iron hull and was at first accepted, as the light hull permitted an increased thickness of armor, but it was finally rejected on account of the anticipated deterioration and loss of speed from the fouling of the bottom. No steps were taken to build any of the batteries at this time; but at the outbreak of the Crimean War the plans of the batteries were again taken up and experiments with armor were begun at Vincennes to determine what the proper kind should be. These tests resulted in showing the inferiority of laminated plating as compared with solid plates of the same thickness. Solid plates 4 inches thick were broken, but not pierced, by both 32-pounder solid shot and 8-inch and 9-inch hollow shot. It was therefore decided to armor the batteries with 4.5-inch plates. About 1846 or 1847 Lieutenant Hunter, of the United States navy, brought out a plan of an armor-deck for the protection of the machinery of vessels, and it very closely resembled, in all its features, the protective deck of 30 years later. In September, 1854, the French government began the construction of several of the armored floating batteries fitted with weak auxiliary steam power, for which designs had been prepared some years before. Three of them took part—the principal part—in the attack upon the Russian batteries at Kinburn, Oct. 17, 1855. While practically uninjured themselves, they were able to lie so close to the enemy's works, 800 yards away only, that they dismounted nearly half his guns and compelled him to surrender after four hours' firing, though these batteries had held at bay the combined wooden fleets of France and England for months. The plans of these armored vessels were sent to England by the French Emperor. After considerable opposition and delay the Admiralty began the construction of similar vessels, but they were completed too late to join in the attack on the Kinburn forts, as they did not reach the Crimea until October 24, seven days afterward. The success of the French armor-clads was followed at once by renewed and widespread interest in the armoring of ships. The French Conseil des Travaux de la Marine then determined to construct some sea-going armor-clads. Before elaborating a design, further experiments were made with armor plates, which resulted in the adoption of armor five inches thick. The thickness of plating and the general features of the design having been decided upon, plans were invited. Those of Constructor Audenet were accepted, and were carried into effect by the building of the *Couronne*. In the meantime M. Dupuy de Lôme had been studying the results of the recent armor trials. In November, 1857, he laid his plans and proposals before the government, and in March, 1858, was begun the conversion of the 13-knot, 5000-ton wooden line-of-battle ship *Napoléon* into an armor-clad. On this ship, which was renamed the *Gloire*, the armor was applied very liberally, extending from well below water to the deck above the battery; the water-line belt being 4.75 inches thick, backed by 26 inches of oak, and the armor of the battery 4.5 inches thick with 24 inches of backing.

With the armor trials for the plating of the batteries used at Kinburn, in which the superiority of the solid plate was shown, the steady development of armor commenced. Before the application of armor to sea-going ships, which began with the *Couronne* and *Gloire*, the investigation of its qualities naturally lacked impetus, but henceforward its improvement was steadily sought, and its manufacture soon became a separate industry. The quality of the early plates was very poor, showing lack of facilities for manufacture and experience in producing pure and homogeneous metal and in working it. This condition of affairs was speedily altered; heavy hammers and rolls were rapidly brought into use, and by 1862 the manufacture of homogeneous wrought-plate was brought to the highest state of perfection, both in England and France. In the meantime gun and projectile makers had not been idle. The 32-pounder and 68-pounder smoothbores using solid cast-iron projectiles were the standards for armor testing; the 8-inch, 9-inch, and 10-inch shell guns were brought out long before the application of armor to seagoing ships, but shells from these guns were too light, and the shot of too low velocity, to render them superior to the longer pieces mentioned.

Rifled guns began to be used commonly about 1860; France, Prussia, and Russia adopted them in 1858, the two latter deciding upon the breech-loader. France retained the muzzle-loading system until 1864; the *Gloire* was armed with a battery of muzzle-loading rifles in 1859, though her designed armament consisted of smoothbores. In 1855 Armstrong brought out a breech-loading piece of small calibre, and Whitworth submitted to the government in 1856 designs for breech-loading and muzzle-loading guns of all calibres. The Armstrong system was adopted for use in the British navy, but repeated accidents led to an outcry against the breech-loading system, and in 1863 the Committee on Designs for Artillery conducted experiments with muzzle-loading guns which led to the adoption of the Woolwich type of muzzle-loader. But whether breech-loading or muzzle-loading, the guns were all *rifles*, and the increased penetrative power rendered all armor so far produced easily vulnerable. The armor makers endeavored to meet the new situation in various ways. The thickness of the plate was increased; steel plates of various kinds were tried, as were plates made up of layers of steel and iron. The steel plates resisted perforation better than wrought iron, but were so easily cracked and destroyed that they failed to gain favor. Whitworth, always in the van in the development of ordnance, made and used forged steel projectiles in 1862, but their value was not generally realized, because the soft iron armor then in vogue was equally penetrable by the cast-iron shot. As the thick-

ness of the wrought-iron plate increased, the difficulties of its manufacture grew rapidly. Neither rolls nor hammer could successfully handle the thickness demanded by ship designers. Resort was had to welding, but this was not satisfactory, first, because it could not be effectively done except by machining the faces to be joined, which added greatly to the expense, and, secondly, because even then the weld was usually imperfect. The next step was to "sandwich" several plates with a layer of wood between them. The result was found to be inferior to that obtained from a single plate, but the plan was for a time accepted as the best available one. In 1866 Gruson in Germany and Palliser in England brought out cast-iron shell with hard, chilled points. These further increased the penetrative power of the gun.

The question of the backing of armor received attention from time to time, and the results obtained are interesting even now. With the low velocities in use up to 1880, wood backing played a very important part, but its importance has diminished in recent years; all thick armor is still backed with wood, but its thickness is about a quarter of that considered desirable in the days of wrought-iron plate. The backing of the *Warrior's* 4.5-inch armor was of teak, 20 inches thick, in two layers of 10 inches each. A less thickness of backing and 5 inches of armor gave inferior resistance to penetration. As projectiles improved in quality and acquired greater velocity, the advantage of thick backing was less apparent; indeed, except for the purpose of reducing the shock to a ship's framing, it is now regarded as disadvantageous, for the same weight added to the plate to increase its thickness will give greater resistance to penetration.

Notwithstanding the confessed weakness of homogeneous wrought-iron plate, a successful competitor was long in coming, though both compound and steel plates early appeared in the competition, as has already been stated. In 1859 the Mersey Works in England submitted 2.5-inch plates made up of three layers, the outer ones of wrought iron welded to a middle one of steel; the welding was imperfect and the brittleness of the steel affected the outer layers; moreover, they were constructed on a wrong principle, as will be seen presently in connection with capped projectiles. In 1861 compound and steel plates were tested in England; while a long series of tests with steel was carried on in France from 1857 to 1861. The theoretical advantages of steel and compound armor were thoroughly understood at this time, but brittleness defeated one and imperfect welding combined with brittleness precluded the use of the other. The preëminence of wrought-iron plate continued practically undisputed until 1876. In 1875 the Italian government called for test plates of 22-inch solid armor from all the principal manufacturers in the world. Four responded—Brown & Co. submitted two solid iron plates; Cammell & Co. one solid plate and one sandwich target; Marrell et Cie. presented the same; and Schneider et Cie. presented for test two solid steel plates. The trials took place at Spezia in 1876, and the result was overwhelmingly in favor of the steel plates; though these cracked more than the others, the difference in resistance to penetration was great. As a result of the Spezia test, wrought-iron plates were fully discredited. In England, where the prejudice against steel was fostered to some extent by national jealousy of a French manufacturer's success, compound armor was rapidly developed. This consisted of a hard steel face welded to a wrought-iron back.

In the Wilson process (Cammell & Co.) molten steel was poured on a white-hot iron plate, thus adding one-third to the thickness of the plate, which was afterward rolled. In the Ellis process (Brown & Co.) a wrought-iron and a rather thin, hard steel plate were separately made. The lower plate was placed in the furnace; iron bars were placed around the edge, forming a berm, and the steel plate laid on the bars. After they were raised to a welding heat, molten steel was poured into the space between the plates, welding all together. There were other systems of compound plate manufacture, but these attained the greatest eminence, if extent of use is a criterion, and they exemplify the type. The first really successful compound plates appeared in 1877, and from that date they competed with steel plates on apparently equal terms until 1889, when Schneider brought out his first nickel-steel plate. The trial of this plate took place in July, but it was not until the next year that attention was fully drawn to the importance of the new metal. The United States naval authorities, having purchased in Europe a compound plate from Cammell & Co., a steel plate and also one of nickel steel from Schneider et Cie., held a competitive test at the naval proving ground, Annapolis, in September, 1890. The compound plate was ignominiously defeated, both by the steel plate and by that of nickel steel. Indeed, the defeat was so complete and convincing that it stopped the manufacture of compound plates at once. The Navy Department had already committed itself to the manufacture of steel armor, and large contracts for it had been given out some years before. The wisdom of the decision in favor of steel had been questioned in Congress and in the public press, and the trial was instituted to convince the doubters; the occasion also served to effect a trial of a nickel-steel plate which had been acquired on account of the promising results obtained by Messrs. Schneider et Cie. the year before. The important results of this trial had hardly appeared when a second trial of like revolutionary character took place. A year or two before, Mr. Harvey, a manufacturer of fine-grade tool steel, was at the Washington gun factory. In a conversation with him, Captain Folger, the superintendent of the naval gun factory, suggested the attempt to adapt the Harvey system of hardening tool steel to armor plate. After considering the matter Mr. Harvey decided to make some experiments looking to surface hardening armor; and the result was the Harvey process of surface carburization and hardening. In this process the plate is placed on the floor of a suitable furnace in a bed of refractory material, leaving the surface to be hardened uppermost. This is covered with carbonaceous material, which is rammed down upon it; over the carbon is put a layer of sand covered in with fire brick. The temperature of the furnace is then raised to about the temperature of melting cast iron and kept so for several days, until the required additional carburization—usually about 1 per cent—is effected. The plate is then removed, and, when cooled to a dull cherry red, is hardened

by a water jet or immersion in running water. The trial of the first plate made by the Harvey process took place Feb. 14, 1891, and was very successful. The popularity of the new armor was immediate, and the cause is not far to seek, for in its construction it embodied the combined views of armor theorists.

Supporters of compound armor accepted the defeat of the year before with reservations. They still adhered to the idea of a hard face and soft back; and they were right in so doing. The advocates of a single, practically homogeneous plate were also satisfied; they held, very properly, that the strength of armor plate must not lie solely in defeating the projectile by breaking it up, but in keeping it out by the toughness of the plate. A third class of critics—more or less in sympathy with the compound armor people, but not completely so, and declaring that no armor is fit to put on a ship which breaks up under attack and leaves the side bare afterward, even if it stops that particular projectile—were also satisfied. In England the Harvey system was adopted almost at once, but notions of misplaced economy and the difficulty of working the resulting metal caused the rejection of nickel in steel. But this view was held only a few years. The next improvement, in 1895, was effected by the Carnegie Company, which found that a reforging of plates after carburizing considerably improved the quality. Soon after the appearance of Harveyized armor, Krupp, Schneider, the Terni Works, and several other European makers began experiments along the same lines. The ones mentioned alone produced any noteworthy results, and it is to be remarked that all three adopted the method of carburization by means of gas rich in carbon. Of these three kinds, the product of Krupp is generally regarded as the best. Krupp armor differs from that previously made, not only in the process of manufacture, but in its chemical constitution. Its exact character is a jealously guarded trade secret, which has been sold at a high price to nearly all the great armor manufacturers of the world, but that it contains a small amount of chromium as well as carbon is now generally understood. Previous attempts to produce chrome steel armor had not been successful, though the trials had been numerous and persistent. Nearly all of the armor now applied to ships, except very thin plates is made by some modification of the Krupp process. The Terni Works in Italy, and Schneider in France, have continued the development of their own processes, which give nearly equal results. In the United States the principal armor makers are the Carnegie Works (United States Steel Corporation), near Pittsburgh; the Bethlehem Steel Company, and the Midvale Steel Company. The armor made by them is considered equal to any made in Europe.

The object of having a hard face to armor is to break up projectiles by shock, or so to strain or deform them as to reduce their penetration. It is particularly effective on oblique impact. To combine hardness with toughness was the aim of armor makers for a quarter of a century, and success was not obtained until the advent of nickel steel. The use of chromium, tungsten, and other substances has further improved these qualities. Had not the improvement of projectiles and guns kept pace with the development of armor, ships could now be made invulnerable; but both have improved so that the relation of guns and armor is now less favorable to the latter than at almost any time in its history. Nevertheless, armor is absolutely indispensable to the protection of ships and their crews against all classes of gun fire. The power of good Harvey nickel-steel armor to resist penetration is about equal to that of double the thickness of wrought iron, and the resisting power of the best modern armor is 20 to 30 per cent greater. These figures are for attack by ordinary armor-piercing projectiles. Projectiles of this type which are fitted with soft caps (see PROJECTILES) penetrate almost as deeply in Krupp as in Harvey armor, and the gain by the use of caps is equal to a reduction in thickness of 8 to 10 per cent in Harvey armor and 15 to 20 in Krupp, i.e., a capped projectile will perforate a Harvey plate 8 to 10 per cent thicker, or a Krupp plate 15 to 20 per cent thicker, than will a projectile not provided with a cap. The penetration in armor of recent United States guns is seen in the accompanying table:

| Gun: Calibre and mark | Length of gun in calibres | Weight of gun Tons | Weight of projectile Lbs. | Muzzle velocity Ft. sec. | Muzzle energy of projectile Ft. tons | Penetration of capped projectiles in armor of recent type | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | At muzzle In. | At 3000 yards In. | At 6000 yards In. | At 9000 yards In. |
| 3-inch, Mark VI | 50 | 1.0 | 13 | 2,700 | 658 | 3.3 | 1.2 | 0.8 | .... |
| 4-inch, Mark VIII | 50 | 2 9 | 33 | 2,800 | 1,794 | 5.3 | 2.6 | 1.5 | 1.2 |
| 5-inch, Mark VII | 51 | 5 0 | 50 | 3,150 | 3,439 | 6.8 | 3.4 | 1.8 | 1 4 |
| 6-inch, Mark VIII | 50 | 8.6 | 105 | 2,800 | 5,707 | 11.3 | 5.2 | 3.2 | 2 3 |
| 7-inch, Mark II | 45 | 12.7 | 165 | 2,700 | 8,338 | 12.0 | 9.0 | 7.0 | 5.0 |
| 8-inch, Mark VI | 45 | 18.7 | 260 | 2,750 | 13,360 | 14.5 | 12.0 | 9.5 | 7.5 |
| 10-inch, Mark III | 40 | 34.6 | 510 | 2,700 | 25,772 | 19.4 | 15 5 | 12.9 | 9 0 |
| 12-inch, Mark VII | 50 | 56.1 | 870 | 2,950 | 52,483 | 25.7 | 22 0 | 18.5 | 15.5 |
| 14-inch, Mark II | 45 | 70.3 | 1,400 | 2,600 | 65,606 | 28.3 | 24.8 | 22.0 | 19.7 |

Thin armor of hardened steel plate, but not surface-hardened, is very extensively used in the interior of recent ships to localize the effects of shell explosions and to resist the explosions of torpedoes.

Another form of armor, not used for ships, but only for fortifications, is made of chilled cast iron, and was developed by Gruson, whose works were located at Magdeburg-Buckau. Herr Gruson died in 1895, and his establishment was then purchased by Krupp. The metal was a specially excellent low carbon cast iron, chilled in the casting on its outer surface, without apparently weakening its tenacity. It is designed and shaped to be used in cupolas of special dome-like form covering one or more guns. Where weight is of no importance it is a very effective defense. Works for its manufacture in the United States were established near Philadelphia.

A full account of the early development of armor by Lieut. E. W. Very, U. S. N., is found in the *United States Naval Institute*, vol. ix, no. 3 (1883). Numerous other papers of less length, but of much value, appear in later numbers of the *Proceedings*, in every number of which there is a brief account of the latest advances in armor development. For additional information consult C. Orde Brown, *Armor and its Attack by Artillery* (London, 1887); also the *Annual of the Office of Naval Intelligence*, United States Navy, especially for the years 1891 and 1892; and *Text-Book on Ordnance and Gunnery for Use at the Naval Academy*, which is revised at frequent intervals. From time to time important articles on armor appear in Brassey's *Naval Annual*.

For further information in regard to armor, see BALLISTICS, *Ballistics of Penetration;* SHIPS, ARMORED; PROJECTILES; GUNS, NAVAL.

**ARMORY** (from *armor*, ultimately from Lat. *arma*, arms). A military depot or building set apart for the use of troops, storage of arms and equipment, or purposes of defense. In the United States the term "armory" is generally applied to local headquarters for parts of the national guard or militia, which are used for purposes of drill, organization, regimental or departmental offices, and the storage of all stores and equipment pertaining to the troops occupying them. In many instances they are magnificent examples of military architecture, from both the interior and exterior points of view. Equipped with every modern convenience and many luxuries, they afford many of the characteristics and advantages of a first-class gymnasium or social club. Such features, however, are secured generally by the officers and men themselves, and contribute largely to the success and good standing of the organization in its particular community. In case of local disturbances, the buildings are admirably adapted for defense, or use as a basis of operations. In England and Continental Europe the name "armory" is sometimes applied to a museum of military antiquities, as the armory at Warwick Castle, England, or at the Tower of London, which, however, contains a store of modern as well as ancient and mediæval arms and armor; it also, and more generally, applies to that part of an arsenal, barracks, camp, cantonment, or fort where are situated the offices and workshops of the armorer and his assistants, or are stored supplies of arms and accoutrements. Examples of the latter may be found in every European military post or station.

**ARMOUR,** HERMAN OSSIAN (1837–1901). An American merchant. He was born at Stockbridge, N. Y., was in business at Milwaukee, Wis., from 1855 to 1862, and as a grain commission merchant at Chicago from 1862 to 1865. He became the New York representative of the Milwaukee packing firm of Armour, Plankinton & Co. in 1865. The firm name of H. O. Armour & Co. was retained at Chicago until 1870, when it was altered to Armour & Co., now controlling the largest provision industry in the world.

**ARMOUR,** JONATHAN OGDEN (1863—). An American capitalist and packer, born in Milwaukee, Wis. He entered Yale, but did not graduate, entering instead the business house of Armour & Co., then conducted by his father, Philip Danforth Armour (q.v.). Upon the death of the latter he succeeded him and became one of the most successful merchants of the country. In later life he became director of important banks and commercial corporations and in 1906 wrote *The Packers, the Private Car Lines, and the People.*

**ARMOUR,** PHILIP DANFORTH (1832–1901). An American merchant and philanthropist, born and educated in Stockbridge, N. Y. In Milwaukee, in 1863, he became the head of the firm of Armour, Plankinton & Co., pork packers, whose main office was transferred to Chicago in 1870, where a reorganization was soon afterward effected under the name Armour & Co. The business increased with great rapidity and sent exports to every civilized country. The firm also invested heavily in collateral enterprises such as the refrigerator car service on the railways and the storage and handling of grain. At the time of Armour's death the firm owned more grain elevators than any other house in the world. Armour was noted no less for his philanthropy than for his business acumen and executive ability. He endowed the Armour Institute of Technology (q.v.) and the Armour Mission, in Chicago, giving them a total of over $2,500,000.

**ARMOUR INSTITUTE OF TECHNOLOGY.** An institution in Chicago for the advancement of technical and practical education. It was founded in 1892 by Philip D. Armour for the purpose of giving young men an opportunity to secure at moderate expense a broad and thorough knowledge of applied science. The College of Engineering offers four-year courses in mechanical, electrical, civil, chemical, and fire-protection engineering, architecture, and industrial arts. The four-year courses in mechanical and electrical engineering were first established and later the course of architecture was included by union with the Art Institute of Chicago. The course in civil engineering was established in 1899, in chemical engineering in 1901, in fire-protection engineering in 1903, and in general science in 1905. In 1912–13 the college faculty numbered 62 and the students 1338. The total value of the institute's property was $5,000,000. President, Frank Wakeley Gunsaulus, D.D.

**ARMS,** ARMORIAL BEARINGS, or ENSIGNS. Names given to such devices as, when painted on a shield, form a coat. These terms in popular speech include all the accompaniments of a shield—viz., the crest, helmet, and, where such exist, the supporters, etc. See HERALDRY.

**ARMS,** ASSUMPTIVE. See HERALDRY.

**ARMS,** SERGEANT AT. See SERGEANT AT ARMS.

**ARMS,** STAND OF. A general title for one or more rifles or other military weapons. It is generally used to describe a complete set of arms for one soldier, including rifle, bayonet, and cartridge box and belt. The term has become almost obsolete in modern military parlance.

**ARMSBY,** HENRY PRENTISS (1853—). An American agricultural chemist, born at Northbridge, Mass. He received the degree of B.S. from the Worcester Polytechnic Institute in 1871 and that of Ph.D. from Yale in 1879. He taught chemistry successively at the Worcester Polytechnic Institute (1871–72), the Fitchburg, Mass., high school (1874–75), and at Rutgers College (1876). After three years as chemist to the Connecticut Agricultural Experiment Station, he was appointed, in 1881, vice-president of the Storrs Agricultural School, two years later professor of agricultural chemistry at the University of Wisconsin, and in 1887 director of

the Pennsylvania Agricultural Experiment Station. This last position he relinquished only after 20 years of service, in order to accept the directorship of the Institute of Animal Nutrition at the Pennsylvania State College. In 1893 he was chairman of the committee on the exhibit of the experiment stations at the Chicago Exposition, and at the Paris Exposition in 1900. In 1898 he began a long service as expert in animal nutrition in the United States Department of Agriculture. Within the same year the Association of American Agricultural Colleges and Experiment Stations elected him their president. He wrote *Manual of Cattle Feeding* (1880); *Principles of Animal Nutrition* (1903); *The Maintenance of the Rations of Farm Animals* (1912).

**ARM'STEAD,** HENRY HUGH (1828–1905). An English sculptor, known also as a worker in metals. He was born in London and studied at the School of Design, Somerset House, and later in the Royal Academy schools. Influenced at first by the superficial elegance of his early instructor, E. H. Baily, he later gained greater insight and strength, and from the time when he was employed by Sir Gilbert Scott to execute parts of the Albert Memorial, his position was assured. He became an associate of the Royal Academy in 1875 and a full member in 1879. Among his portrait statues that of Bishop Wilberforce in Winchester Cathedral is noteworthy; among the few imaginative works, "Remorse," now in the Tate Gallery. Consult his biography by his daughter (1906).

**ARM'STRONG,** ANDREW CAMPBELL (1860—). An American scholar and educator, born in New York City. He graduated from Princeton in 1881, was a fellow of that university for two years, and then entered Princeton Theological Seminary. His course finished in 1885, he went abroad for a period of study at the University of Berlin, but returned to Princeton to become associate professor of ecclesiastical history at the seminary. After two years in this position, and one year as instructor in history at Princeton College, he was called to begin what proved many years of service at Wesleyan University (Middletown, Conn.). In 1887–88 he was associate editor of the *New Princeton Review*, and in 1904–09 was coöperating editor of the *Psychological Review*. He made contributions to several psychological and philosophical encyclopædias, translated Falckenberg's *History of Modern Philosophy* (1903), and wrote *Transitional Eras* (1904).

**ARMSTRONG,** DAVID MAITLAND (1836–1918). An American decorative artist and genre painter. He was born at Newburgh, N. Y., graduated in 1858 at Trinity College, and studied art at Paris and Rome. He served for four years as Consul-General for Italy and at the Paris Exposition of 1878 he was director of the American art department. His activity he confined to decorative art, principally to mural decorations and stained glasses. Among the latter are memorial windows in the Ascension, St. Michael's, Holy Communion, and Holy Trinity churches in New York, and 15 memorial windows in All Souls' Church, Biltmore, N. C. He was made an associate of the National Academy, a member of the Architectural League, and a member of the Legion of Honor.

**ARMSTRONG,** EDWARD (1846—). An English historian and educator, born at Grahamstown, South Africa, and educated at Exeter College, Oxford. He took his final examinations in 1869, became a fellow at Queen's College the same year, and a tutor the year following. After serving as assistant master at Rugby School in 1871–73, he returned to Oxford, where he became prominently identified with Queen's and the university. At the college he served as bursar (1878–1911) and was made lecturer on modern history; by the university he was chosen lecturer on foreign history and a member of the board of finance. He also became curator of the Taylor Institution and of the Botanic Garden, and warden of Bradfield College. Besides contributions to the *Cambridge Modern History* and to leading English reviews, his writings include: *Elisabeth Farnese* (1892); *Lorenzo de' Medici* (1897); *The Emperor Charles V* (2 vols., 1902); *The French Wars of Religion* (2d ed., 1904).

**ARMSTRONG,** EDWARD COOKE (1871—). An American scholar and educator, born at Winchester, Va. He graduated from Randolph-Macon College in 1890 and after advanced work at Johns Hopkins received the degree of Ph.D. from that university in 1897. Additional graduate studies he took at the universities of Berlin and Paris. He was appointed professor of the French language (1897) and chairman of the Romance department (1910) at Johns Hopkins University. He was made a member of several American and foreign learned societies.

**ARMSTRONG,** GEORGE FRANCIS SAVAGE (1845–1907). A British writer, called "The Poet of Wicklow." He was born in County Dublin, Ireland, and was educated in Dublin. In 1871 he became professor of English literature in Queen's University and in 1871–1905 was professor at Queen's College, Cork. His works include: *Poems* (1869); *A Tragedy of Israel*, a trilogy (1872–76); *Stories from Wicklow* (1886); *Ballads of Down* (1901), and *The Crowning of the King* (1902). An edition of his poems in 10 volumes was published in 1892. In later life he used the hyphenated surname, Savage-Armstrong.

**ARMSTRONG,** GEORGE FREDERICK (1842–1900). An English engineer. He was educated at King's College, London, and at Cambridge. Developing a strong taste for mechanics, he studied engineering, and was professor of engineering in the School of Applied Science at McGill University in Montreal during 1871–76. He was then called to a similar chair in the Yorkshire College of Science, Leeds, and in 1885 became regius professor of engineering in the University of Edinburgh. He is a member of many learned societies and the author of numerous papers and addresses.

**ARMSTRONG,** HENRY EDWARD. An English chemist, professor of chemistry at the City and Guilds College, South Kensington. He was awarded the Davy Medal by the Royal Society in 1911. His publications include: *Introduction to the Study of Organic Chemistry: the Chemistry of Carbon and its Compounds* (5th ed., 1886); *Marine Hygiene* (1893); *The Teaching of Scientific Method* (1903; 2d ed., 1910); *Low-Temperature Research* (1909).

**ARMSTRONG,** JOHN (1709–79). A Scottish poet, born in the parish at Castleton, Roxburghshire. He took the degree of M.D. at Edinburgh University in 1732; in 1746 was appointed physician to the London Hospital for Lame, Maimed, and Sick Soldiers, and in 1760 physician in the German army. He gained a wide popularity by

a didactic poem called the *Art of Preserving Health* (1744), containing some of the very best blank verse written in the eighteenth century; and was also a master of terse prose. Particularly brilliant is *Sketches or Essays on Various Subjects*, published under the pseudonym of Launcelot Temple (1758). He was a friend of many wits and authors of his day, among them Thomson, who is believed to refer to him in canto I, stanza lx of the *Castle of Indolence;* and Wilkes, who probably obtained for him the post in the army. He wrote also *An Essay for Abridging the Study of Physic* (1735) and *Economy of Love* (1737). Consult Ward, *English Poets*, vol. iii (New York, 1894–1903).

**ARMSTRONG,** JOHN (1725–95). An American soldier, born in the north of Ireland. He led a successful expedition in 1756 against the Indians at Kittanning, Pa. He became a brigadier-general in the Continental army in March, 1776, but resigned in April, 1777, to take the same rank in the Pennsylvania militia, which he commanded at Brandywine (September 11) and at Germantown (October 4), becoming a major-general in January, 1778. He served twice in the Continental Congress (1778–80 and 1787–88). He died at Carlisle, Pa.

**ARMSTRONG,** JOHN (1758–1843). An American soldier and diplomat, son of John Armstrong, the soldier. While a student at Princeton he enlisted in the army and was soon made aid-de-camp to General Mercer, with the rank of major, which rank he retained until the close of the war. He wrote and published anonymously the famous *Newburgh Addresses* in 1783, in an effort to force Congress to pay certain amounts due army officers, and in 1784 conducted a campaign against the Connecticut settlers in the Wyoming valley. (See WYOMING VALLEY.) At the close of the war he served as Secretary of State and Attorney-General of Pennsylvania and in 1787 was elected a member of Congress from that State. In 1789 he married the sister of Chancellor Livingston, of New York, and, removing to that State, was in 1800 elected United States Senator and served in the Senate until 1804. From then until 1810 he was Minister to France, being also Minister to Spain (1806–10). He was appointed brigadier-general in July, 1812. In January, 1813, he was made Secretary of War, but in consequence of the failure of the Canada expedition and the capture of Washington he became very unpopular and resigned in September, 1814. He published *Notices of the War of 1812* (1836), memoirs of Generals Montgomery and Wayne in Sparks's *American Biographies*, and partially prepared a history of the American Revolution. Consult Henry Adams, *History of the United States, 1801–1817* (New York, 1889–90).

**ARMSTRONG,** JOHN (1784–1829). An English physician and medical writer. He was born at Ayres Quay, near Bishop Wearmouth. He studied medicine at the University of Edinburgh and in 1811 was chosen physician to the infirmary at Sunderland. In 1816 he published a work on *Typhus*, which greatly increased his reputation. Two years later he removed to London, where his practice became extensive, and he was elected physician to the Fever Hospital. He was instrumental in establishing two medical schools in London. His lectures were published after his death. Consult *Memoirs of the Life of J. Armstrong*, by F. Boott (London, 1834).

**ARMSTRONG,** JOHNNIE. The hero of several old Scottish songs and ballads, among which are "Armstrong's Goodnight," and two others, both called after his name. A border freebooter, who lived with his lawless followers in the early part of the sixteenth century, he was finally hanged with 36 of his retainers, by James V in a forest near Hawick.

**ARMSTRONG,** PAUL (1869–1915). An American playwright, born at Kidder, Mo. He was for five years, from 1890 to 1895, a licensed master of steamships plying on the Great Lakes, but in 1904 began the writing of plays, and produced many successful dramas. These include: *The Heir to the Hoorah* (1904); *St. Ann* (1904); *Salomy Jane* (1905); *In a Blaze of Glory* (1906); *Via Wireless* (in collaboration with Winchell Smith, 1909); *Going Some* (with Rex Beach, 1909); *Alias Jimmy Valentine* (1909); *The Deep Purple* and *The Greyhound* (with Wilson Mizner, in 1910 and 1911, respectively); *A Romance of the Under World* (1911); *The Escape*, played in New York in 1913.

**ARMSTRONG,** ROBERT (1790–1854). An American soldier, born in Tennessee. In the Creek War of 1813–14 he commanded an artillery company, and was severely wounded at Talladega, Jan. 24, 1814. He commanded the artillery at the battle of New Orleans (Jan. 8, 1815) and was a brigadier-general of volunteers in the second Seminole War (1835–37). From 1845 to 1852 he was Consul at Liverpool. Later he became proprietor and editor of the *Washington Union*, at which time he acted as confidential adviser of President Polk.

**ARMSTRONG,** ROBERT ALLEN (1860—). An American scholar and educator, born at Frenchton, Va. (now a part of West Virginia). He graduated from West Virginia University in 1886 and then took advanced work at the University of Chicago, Columbian (now George Washington) University, and at Harvard University. While acting as principal of the West Liberty State Normal School he studied law and in 1890 was admitted to the bar. Appointed professor of English at West Virginia University in 1893, he was 10 years later made head of the English department. In addition to his regular academic duties, he spoke much before institutes in a number of States (after 1886), was secretary of the West Virginia Board of School Examiners (1899–1909), and undertook in 1904 the editing of the *School Journal* of the same State. In 1909 he received the degree of L.H.D. from Allegheny College. His publications include, beside articles contributed to educational journals: *Geography of West Virginia —Supplement to the Natural Geography* (1899); *Life out of Death* (1906); *The Law of Service* (1907); *Historical and Literary Outlines of the Bible* (1907); *Dramatic Interpretation of Shakespeare's Tragedies* (1907); an edition of Stevenson's *Inland Voyage* (1913).

**ARMSTRONG,** SAMUEL CHAPMAN (1839–93). An American soldier and educator. He was born in Hawaii, where his father was a missionary of the American Board and Minister of Public Instruction. He began his collegiate course at Oahu College, Hawaii, and completed it in 1862 at Williams College. He was for a short time chief clerk of the Department of Public Instruction in Hawaii and editor of *Hae Hawaii*. He then entered the Union army, and in 1863–65 was colonel of the Eighth United

States colored regiment. At the close of the war he was brevetted brigadier-general of volunteers. He was superintendent of a district of 10 counties in Virginia in the Freedman's Bureau, 1866–68. In the latter year he founded and became principal of the Hampton Normal and Agricultural Institute. His constant endeavor was to show the best methods of educating the negro and Indian races in this country, adopting to that end a system of combined labor and study, to give them the means of self-support, develop manual skill, and promote manliness and self-reliance. His work for the neglected races produced most beneficial results. Several published papers give his views on the education of negroes and Indians. Consult R. C. Ogden's *Sketch of Armstrong* (New York, 1894).

**ARMSTRONG,** SIR WALTER (1850—). An English writer and art critic. He was born in Roxburghshire, Scotland, and was educated at Harrow and at Exeter College, Oxford. After serving as an art critic on the staff of the *Pall Mall Gazette* and *St. James's Gazette,* he was in 1892 appointed director of the National Art Gallery, Dublin, and was knighted in 1899. Although a very prolific writer upon art subjects, he is at the same time considered one of the soundest and most critical scholars in this line that the United Kingdom has produced, combining a knowledge of the technique of art with a profound appreciation of its historic significance. His principal works are: The "Art of Velazquez" and the "Life of Velazquez" (1896) written for the *Portfolio; Scottish Painters* (1888); *Art in Great Britain and Ireland* (1909); and excellent biographies of Gainsborough (1898), Sir Joshua Reynolds (1900), J. M. W. Turner (1901), Sir Henry Raeburn (1901), and Sir Thomas Lawrence (1913).

**ARMSTRONG,** WILLIAM GEORGE, BARON (1810–1900). An English engineer, scientist, and inventor of hydraulic machinery and ordnance. He was born at Newcastle-upon-Tyne and received his early education at Whickam and Bishop Auckland. Yielding to his father's wishes, he determined to follow the profession of law and spent several years in a solicitor's office, but was diverted from this calling by a taste for scientific research and mechanics. His first important discovery was the hydro-electric machine, which consisted of an insulated boiler from which steam at high pressure, escaping through nozzles of peculiar design, produced frictional electricity. In recognition of this discovery, Armstrong was made a fellow of the Royal Society in 1846. Soon afterward he invented the hydraulic crane, and for the construction of hydraulic machinery he founded the Elswick Engine Works, in the suburbs of his native town. In 1854, at these works, were made the rifled cannon with which his name is associated as inventor, although previous unsuccessful attempts had been made to develop the rifled cannon. So successful was he in his construction of ordnance that he was appointed engineer of rifled ordnance at Woolwich, and was knighted in 1859. Some 3500 cannon were constructed under Sir William Armstrong's direction between 1859 and 1863, when he resigned his official position to resume his active connection with the Elswick Works. In 1863 he was president of the British Association, and delivered an address in which he called attention to the decrease in the coal supply of Great Britain and the exhaustion of the deposits. In 1882 he was president of the Institution of Civil Engineers and served in a similar capacity for several terms in the Institute of Mechanical Engineers. A member of the Iron and Steel Institute of Great Britain, he received from that organization the Bessemer Medal in 1891, and was honored with the degree of LL.D. from Cambridge in 1862 and that of D.C.L. from Oxford in 1870. In 1887 he was raised to the peerage. The Elswick Works, which at first were concerned with the construction of hydraulic cranes, engines, accumulators, and bridges, were greatly expanded and became celebrated for the production of ships of war as well as ordnance and machinery. Lord Armstrong played an important part in the development of the breech-loading cannon and armor plate, and his improvements will be found discussed in the articles ORDNANCE and ARMOR PLATE.

**AR'MY.** See ARMIES and ARMY ORGANIZATION.

**ARMY ADMIN'ISTRA'TION.** See ARMY ORGANIZATION.

**ARMY CORPS,** kōr. See ARMY ORGANIZATION.

**ARMY ES'TIMATES,** UNITED STATES ARMY. The estimates furnished annually by the heads of the various branches of the War Department, giving a statement of their requirements and the amount of money necessary for the same. The estimates are addressed to the Secretary of War, who, in his report to the President, submits the same, together with his comments thereon. The President, in his turn, sends the estimates to Congress, upon which the House of Representatives draws up the Army Appropriation Bill, which is then sent to the Senate for final action. The appropriations are expended by the heads of departments, under the general direction of the Secretary of War, after which the final accounts are audited by the auditor for the War Department of the Treasury. The same general procedure obtains in all other civilized countries, varying only in details due to the various governmental constitutions.

**ARMY OR'GANIZA'TION.** The power of an army rests on two elements: its *material* strength and its *moral* strength; the former depending on the character of its commanders and soldiers and its organization, the latter being determined by its discipline, the system of military education, and the national spirit. *Organization,* in a military sense, comprises, in general, all the measures taken to insure to the army a regular and normal working of all its parts, to provide it with all the necessary machinery, to obtain for it regularly all that it requires, to insure its proper instruction, to protect the rights and prescribe the duties of each individual by suitable regulations, to supply the personnel and material which it needs, and, finally, to provide all the means whereby nothing may be wanting to enable it to fight under the most favorable conditions. In a limited sense the word "organization" is also used to designate the composition or formation of any body of troops; but this is only a particular application of the general meaning of the word.

The entire theory of organization rests upon the principle of individual responsibility and subordination, so that, no matter how small or how great the number of individuals gathered together, some *one* is responsible, to whom the others must be subordinate. This responsibility

and subordination are the great factors in the control of an army, and tactical organization may be defined as the arrangement of an army in such wise as to enable it, in whole or part, to respond at all times to the will of the commander promptly and efficiently. One of the first elements of strength in an army is the skillful organization of its *command*, and in this all nations are agreed as to the necessity for *unity*—i.e., for a *commander-in-chief* of the forces. Next in importance are the assistants to the commander-in-chief, viz., the staff and the entire corps of officers. Finally, arises the question of the number of men to be assembled under one leader, into bodies of various strength, their most advantageous subdivision, and the proportion of accessories of all kinds to be joined to the combatant forces. The army, then, is made up of a collection of units, differing according to the purpose of the organization. Thus *tactical* units are the basis of organization for the tactical handling of troops in the field, while *administrative* units are the basis for administration and supply. A *tactical* unit is the largest body of men which can be directly commanded by the voice of a single commander. An *administrative unit* is the smallest organized subdivision having a complete administration of its own.

**Combined Arms.** If we define the *strategical unit* as the smallest body composed permanently of two or more arms and capable of acting independently, then the *division* must be regarded as that unit, as it includes in addition to infantry, artillery and enough special troops to make it independent. Ordinarily the brigade (infantry or artillery) is the largest unmixed unit. The cavalry division which figured but little in the World War on the western front, is composed essentially of two brigades and two or three horse batteries, besides special troops. The infantry division (the smallest unit in which the various arms are combined) consists in general of two infantry brigades, one field-artillery regiment, and other special troops differing in the different countries. In the older days and especially in the United States Army there was also a cavalry regiment.

The highest definite unit of organization is the *Army Corps*, and its strength is determined by the fact that in its most unfavorable formation it must be capable of being assembled or any portion of itself in a single day. It is composed of two or more divisions and the necessary auxiliary troops. Armies are simply aggregations of army corps. With changes in weapons, transportation and aircraft, the proportion of cavalry has been gradually made smaller since the days of Frederick, while that of the artillery has been gradually increased, and this was amply shown in the World War; as its place in large measure was taken by the airplane or some form of motor vehicle. The proportion of artillery in flat, heavily wooded country, or in difficult mountainous country, or in country where the roads are bad, is usually decreased, because the full proportion cannot be used advantageously, and a smaller proportion would diminish the length of the column, which is always desirable. The late war also showed that aircraft must be considered as weapons of offense as well as for observation.

Thus far only the line of the army, in its most restricted sense, has been considered, but the efficient working of an army also requires a number of special troops, such as engineers, pioneers, railroad engineers, pontoniers, sappers and miners, signalers, telegraphers, balloonists, and the medical corps. In European armies all the special troops, excepting the medical corps, were designated by the general term *technical troops*.

Any plans or tables of army organization must necessarily be more or less theoretical until they are submitted to the test of practice, and likewise with the changing conditions of modern warfare due to industrial, mechanical and scientific developments, it is inevitable that new schemes of organization must be developed to meet new conditions of personnel and matériel. Combat conditions as developed on the battlefield may alter the strength and composition of tactical units, while the scene of conflict and its distance from bases may bring about unexpected conditions in administration and supply, requiring a modification of previous schemes and tables.

In the early days of mobilization for the World War the organization of the various European armies functioned with reasonable success, but when combat conditions developed, then changes were found necessary. The German army had an inflexible organization that had been under development for years; on the other hand the American Expeditionary Forces inevitably, as well as specifically, under the broad powers of the Commander-in-chief was free to develop its own organization, and to disregard precedents or even attempted or partially developed plans of the War Department at the seat of government. Furthermore, as regards its administration, unlike the armies of the Allies, the United States forces were distant not only from their bases but from seats of government control, so that many functions exercised were those properly belonging to a war office. For the combat units the experience and advice of the Allies were available making it possible to take the best elements of each, and modify them as required for special conditions. In the main, however, the organization of the American Expeditionary Forces and of the units in training in the United States clearly represented the best that the critical experience of French and British staff experts could develop. So that any discussion of the American Army organization in the World War reflects not merely the national military characteristics but the best practice of European schools and battlefields, and it must be further understood that the general organization of the British differed but little from that of the French on which the American scheme was frankly based.

The General Staff of the American Expeditionary Forces, organized at the outset by General Pershing had problems quite unlike those of the Allies, for the army organization had to be united to the war administration proper. The French army was at home and in close touch with the civil government, while the British, though organized on an overseas basis with difficult problems of supply and replacement, nevertheless were not so far from their bases. The Americans had to send their troops at first on irregular schedules and then arrange for their supply so that transportation and supply from the distant bases were factors felt in the scheme of organization.

The combination of the various arms into a tactical unit presents a problem in organization which may be solved on a permanent basis, or

it may be developed in the light of circumstance and experience, as was the case in the organization of the fighting units of the American Expeditionary Forces. Here a leading consideration was the great distance of the combatants from their original base so General Pershing and his staff decided on a form of organization where the front-line units would be strong enough both in troops and material to maintain themselves for a considerable time without calling for fresh supplies and reinforcements. As a result the American organization was less flexible than the French, and the units about double in numerical size especially when the depletions of four years of conflict were considered. While General Pershing's army corps varied in composition, nominally it was formed on the basis of six divisions, four of which were to be employed in active service, one for replacement, and one for depot. In addition to the regular divisions there were a number of corps or non-divisional troops so that a normal American corps, commanded by a major-general during the war, would have amounted to some 6050 officers and 170,000 men. In the scheme of organization developed five army corps would constitute an army operating under one independent command, though here again in actual practice there was variation in the American Expeditionary Forces as there was in the European armies. To the army and to the army corps there were certain troops assigned not included in the division; these were such organizations as army traffic police, pioneer infantry, army artillery, signal troops, aviation troops, sanitary troops, and train, to the army, and for the corps, corps artillery (heavy), trench artillery, anti-aircraft artillery, anti-aircraft machine guns, cavalry, infantry pioneers, engineers, 1 field signal battalion, 1 telegraph battalion, pontoniers, train and aviation units. The non-divisional troops in an army corps included about 500 officers and 16,000 enlisted men.

The American division as stated was larger than the French or British and normally included 979 officers and 27,080 men. It comprised 2 infantry brigades, 1 brigade of field artillery, 1 battery of trench mortars, 1 engineer regiment of 2 battalions, 1 field signal battalion, and the appropriate train and service troops. The division was commanded by a major-general with a staff of 40 officers and 200 men. The chief of staff was a colonel and with him were 3 field officers respectively in charge of supply (G–1), information (G–2), and operation (G–3); as well as 3 aërial observers, an inspector-general, an adjutant-general, a judge-advocate, a gas officer, a signal officer, 1 machine gun officer, and 1 division chief of engineers.

**Infantry.** The tactical unit of infantry in the great armies of the world is the battalion, composed of about 1000 men, and divided into four companies of about 250 men each. In the United States army the battalion previously had been of very variable strength in time of war, but was usually considerably smaller than the European battalion.

During the World War the American battalion comprised 26 officers and 1000 men, being divided into 4 companies, each of which comprised 6 officers and 250 men. There were 4 platoons of 58 men each, and a small headquarters detachment of 18 men. The battalion is commanded by a major and each company by a captain. For administrative purposes 3 battalions are formed into a regiment commanded by a colonel assisted by a lieutenant-colonel. In addition to the three battalions there was also a machine-gun company of 6 officers and 172 men, a headquarters company of 3 officers and 336 men divided into five platoons; one headquarters platoon including the band, one platoon of telephonists and signalers, one platoon of sappers-bombardiers, one platoon of pioneers, and one platoon of three 37-mm. guns. During the World War the American Expeditionary Forces followed the prevailing European practice of forming two regiments into an infantry brigade the largest unit composed exclusively of infantry and commanded by a brigadier-general. Such an infantry brigade was composed of 246 officers and 8169 men and included in addition to the two regiments a staff of 4 officers and 20 men and a machine-gun battalion of 4 companies.

**Mounted Infantry.** Mindful of conditions prevailing in South Africa, 1899–1902, Great Britain organized and developed mounted infantry, as this arm had proved so effective on both sides. This body of troops was not carried in an organized form in England in time of peace, but it was provided that a certain number of men, selected and detailed from the forces, should be trained for this service. In time of war each battalion was to receive one of the four sections of a company, and a cavalry division a battalion of 8 companies. Little opportunity was found in the World War for the use of mounted infantry owing to changed circumstances and the more static conditions of many of the operations. When infantry or troops generally required to be moved they were transported by any or all agencies that the motor transport, railway or other organizations could bring to bear, but in general the considerations influencing the use of cavalry applied to mounted infantry.

**Machine-Gun Companies.** In the World War the tactical organization of the machine-gun units varied very much not only on account of combat conditions, but with the diversity and development of material ranging from the light automatic rifle fired from hip or shoulder and weighing about 16 lbs. to the heavy machine gun transported on wheels or a motor car. As was stated in connection with the infantry, a machine-gun company was included in each regiment, while a machine-gun battalion of 4 companies was assigned to each infantry brigade and a motorized machine-gun battalion of 2 companies to each combat division. The tendency during the war was to increase the number and efficiency of the machine guns used and the organization was arranged to that end.

**Artillery.** The tactical unit of field artillery is the battery, composed in the United States army usually of 4 guns, and the appropriate caissons, forge and battery wagon, and supply and store wagons. The battery may be motor-drawn or horse-drawn and tractors may be used for both guns and supply wagons, with motor trucks for the personnel. A battalion is composed of from two to four batteries, and constitutes an important organization on the battlefield. The tactical unit of coast arillery is also the battery, composed in this case, however, of a variable number of guns, usually from one to four. The administrative unit of artillery is the regiment, composed of from two to five battalions. The coast artillery, which composes a

separate corps in the United States army is distributed in coast-defense commands (the entire defense of harbor or post), regiments of coast artillery (motorized, railway, etc.), anti-aircraft battalions, several ranging companies, and trench mortar companies.

In the World War the divisional artillery comprised one brigade of three regiments of two or three battalions each, the battalion being made up of two or three batteries, the 75-mm. guns being usually grouped three batteries to a battalion, and the heavier guns and howitzers two batteries to a battalion, 24 pieces forming a regiment. Each division also had a trench mortar battery composed of 5 officers and men with varying equipment. In command of the artillery brigade was a brigadier-general with a staff composed of 9 officers and 54 men. Ordinarily the brigade effective in the war amounted to 208 officers and 4769 men along with 3883 horses, but in respect to the last item there was a tendency to employ motor transport to an ever increasing extent. The divisional artillery, of course, was designed to operate in connection with the infantry. With the corps, however, was grouped a considerable amount of the heavier guns formed into a brigade of corps artillery, which was usually that of the depot division comprising one regiment of 155-mm. heavy guns and one regiment of 4.7-inch guns or else two regiments of 155-mm. guns. Along with this was a battalion of trench artillery comprising four batteries of 240-mm. trench mortars and a battalion of four batteries of auto cannon for anti-aircraft defense as well as a machine-gun battalion for the same purpose. For the army a number of artillery brigades and separate units comprising the heavier guns and mortars as well as the equipment for their repair and maintenance.

**Cavalry.** The tactical unit of cavalry is the squadron. In the United States service the squadron is composed of four troops, the strength varying in peace and war and in different plans of organization. The administrative unit is the regiment, composed of three squadrons in the United States. The brigade, in Europe, consists normally of two regiments; in the United States service, of three. The plan of organization adopted during the World War did not provide for the use of cavalry with the division as European experience had found but slight occasion for their employment, and where they were included they were dismounted or used for headquarters guards and service.

**Engineers.** The engineer troops of all armies are usually organized like infantry, though on account of the wide range and character of service in the World War there was considerable difference in different units. With the combat division there was one regiment of engineers divided into two battalions of three companies each, with the appropriate engineer train. In the corps were included also a regiment of engineers, as well as a detachment of pontoniers. For the army and the service of supply in addition there were required large numbers of trained construction troops and transportation units so that there was often involved an adjustment between military and industrial organization, though the former was never lost sight of and the responsibility of rank and command always prevailed irrespective of the size or organization of the component units.

**Signal Troops.** The Signal Corps of the United States army has charge of the field and military telegraph, and telephone, radio communication, and ordinary signaling or communication of intelligence by flag, torch, heliograph or other means, and meteorological and photographic service. (See SIGNALING AND TELEGRAPHING, MILITARY.) In the field a division will have attached to it one field signal battalion formed of a headquarters and supply section, 1 wire company, 1 radio company, and 1 outpost company; in the World War a total of 14 officers and 495 non-commissioned officers and men. The headquarters and supply section carried on the administrative services of the field signal battalion and distributed accumulators and carrier pigeons. Military telegraphers are organized in a different way in almost every existing army. In the United States and Great Britain the Signal Corps, in time of war, is augmented by telegraphers from civil life.

**Air Service.** The air service in each of the great armies required a systematic organization though this varied from time to time and in different services, influenced in no small degree by the increased rôle of aviation especially in taking its place as a combat arm. In the American Expeditionary Forces there were observation squadrons, pursuit squadrons, day bombardment, night bombardment squadrons, army and corps squadrons, and instruction squadrons. In addition there were service and repair parks and stations as well as acceptance and test parks and depots. In addition there are balloon companies which operate the balloons available for observation and the dirigibles. The observers it may be said are usually trained artillery officers.

**Medical Department.** The organization of the Medical Department of the American Expeditionary Forces in the World War was divisional, the sanitary personnel of each division being under the direction of a lieutenant-colonel of the Medical Corps. The divisional sanitary train consisted of 4 ambulance companies, 3 automobile and 1 horse-drawn ambulance and 4 field hospitals of 3 automobile and 1 horse-drawn ambulance, 1 medical supply unit and 1 mobile laboratory. Each ambulance company consisted of 12 ambulances and 3 trucks, while the field hospitals, each of which could accommodate 216 patients, were equipped with tents which with the other material was transported on trucks or wagons. There were 50 officers and 901 enlisted men in the divisional sanitary train. For each regiment there was a medical detachment composed of 7 officers and 481 enlisted men. The sanitary train of the army corps consisted of 3 field hospitals and 3 ambulance companies while the army sanitary train in addition included 4 field hospitals and 4 ambulance companies. For each division in the army 2 evacuation hospitals and 1 mobile hospital is under the direction of the chief surgeon of the army. In addition to the medical activities in the army zone there were elaborate organizations in the zone of the seas.

**Military Police.** *Provost Marshal General's Department.* In the American Expeditionary Forces the Provost Marshal's Department was divided into four main sections: the Military Police Corps which served with divisions, corps and armies and in the sections of the services of supply; the Prisoner of War Escort Companies; the Criminal Investigation Department;

and the Circulation Department. The Military Police control traffic in the battle zone and in towns and cities occupied by troops through which traffic flowed they maintain order in camps and billets. The strength of the American Military Police was placed at 1 per cent of the strength of the American Expeditionary Forces and provost marshals were provided for armies, corps, and divisions.

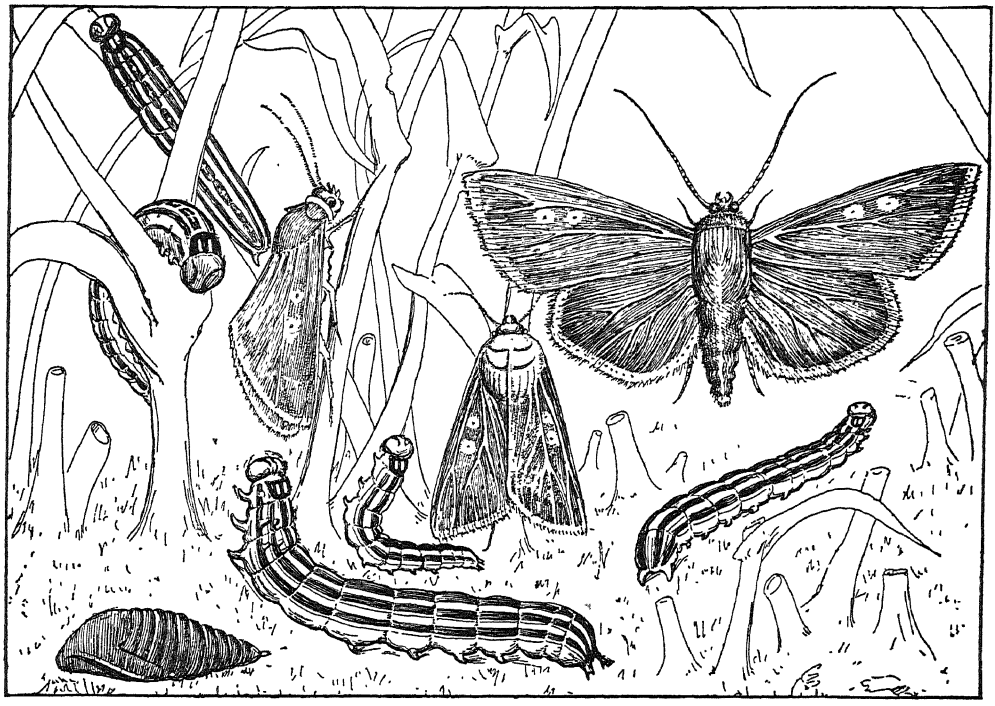
**Train.** The term *train* is applied not only to the wagons and motor vehicles of an army, but also to the troops who drive them. In the larger armies in times of peace and in practically all armies in time of war these troops are specially organized and trained for the purpose. In addition to the transport of the individual units each division had its own train for ammunition, supply, engineer and medical department arranged on a basis sufficient to take care of a command of this size. In addition the corps and army had their respective trains, the arrangement in all respects being a flexible one. During the World War the American Expeditionary Forces developed constantly this division of service, there being a special Motor Transport Department.

An important feature of the organization of the army is the STAFF (q.v.), which may be either military or administrative. This branch, together with the subjects of RANK AND COMMAND, RECRUITMENT, and DISCIPLINE, will be found discussed under the appropriate heads; while the actual use and operation of an army and its component parts are treated under TACTICS, MILITARY; COAST DEFENSE. See ARTILLERY, CAVALRY, INFANTRY, and MOUNTED INFANTRY for the historical development of these arms in which the changes in organization are discussed. Ancient and modern armies will be found treated under ARMIES and ARMY under name of country. Under each of these articles will be found a bibliography. Reference also should be made to SUPPLEMENT, dealing in full with the World War, and to the various tables of organization developed during and after the World War for the various arms of the U. S. Army. General Pershing's *Final Report* (Washington, 1919) has full charts of the organization of the American Expeditionary Forces.

**ARMY REGISTER, UNITED STATES.** The official publication issued each year from the Adjutant-General's office, by the Secretary of War. It contains a list of the officers of the army, giving the department, regiment, or corps to which they belong or are assigned; together with information regarding their place of birth, the State from which appointed, whether entered from civil life or the Military Academy, date of entry, and rank held at the time; also the dates of commissions held in the permanent establishment and in the volunteer service, together with the highest brevet rank. It also contains a list of retired officers and aids to general officers; the officers and professors of the Military Academy, and the first five cadets of each class. The lineal rank and the relative rank of officers are given, as well as the officers who have been commissioned for distinguished services, who have received the thanks of Congress, and who have held staff appointments other than under commission, and on whom brevet rank has been conferred. Recipients of congressional medals of honor and certificates of merit are also listed. The casualties during the year are given, as well as military commands and posts, armories, arsenals, and recruiting, engineer, and ordnance dépôts, and the organizations or detachments of the army stationed there. There are included statements regarding the pay of the army and militia forces of the United States; the students at universities, colleges, etc. The data concerning officers also show those who have graduated from the service schools or from the war college at Washington. A table is appended showing in detail the complete organization of the United States army. All foreign nations issue similar lists; in Great Britain it is known as the *Army List* and is issued quarterly and in abridged form monthly. This is necessary owing to the constant changes of stations and assignments incidental to the itineration of the army.

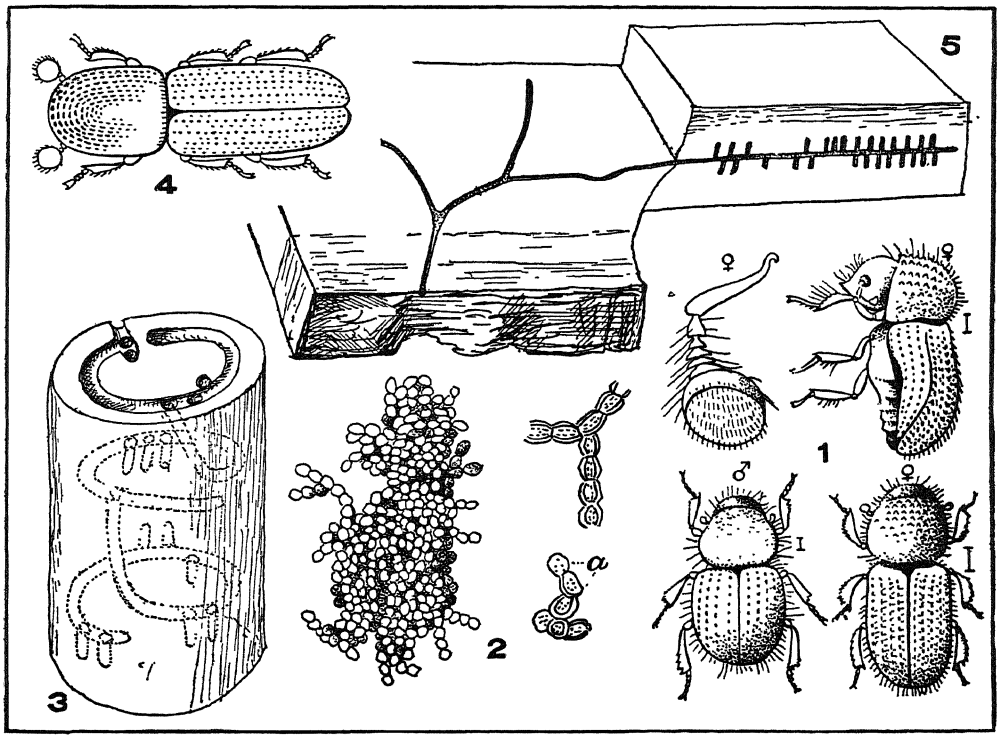
**ARMY SCHOOLS.** Schools for the education of non-commissioned officers and men and their children. In the United States they are known as Post Schools. The most important factor in the making of a thoroughly efficient soldier is a good education. Modern war tactics place more and more responsibility on the individual soldier, and the comparative distance which the private often is, in action, from those from whom he usually takes his orders, makes it absolutely essential that he be trained in the proper use of every faculty. Non-commissioned officers are the backbone of the modern army, so that what is strongly encouraged in the private is an imperative necessity in their case. In all the armies of to-day the most exacting and rigid examinations are compulsory for all soldiers desirous of promotion. In the British and most of the Continental armies the education of the soldier is compulsory up to a certain point and is strongly encouraged beyond that. The educational test always precedes the military or purely professional examination, without the successful passing of which the latter is impossible. To such a high degree of efficiency, in fact, have these nations brought this branch that it is possible for a soldier to enlist, absolutely illiterate, and at the conclusion of his service leave with the equivalent of a civil college education, if he has applied himself assiduously and has taken full advantage of all opportunities. In Germany opportunities for technical mechanical education are also available. Schoolmasters are a part of their army system and are classified for purposes of pay and promotion. In the United States the post school is required to be established and is the direct concern of the officer commanding the post. Efficient officers supervise the work, and enlisted men possessing the required qualifications are detailed as instructors, in the proportion of not exceeding 1 to every 15 men attending school. If there is a chaplain stationed at the post, he is usually placed in charge. The general supervision of army schools is directed from the headquarters of the respective department commanders, but their official inspection is performed by officers of the inspector-general's department. Post schools for the children of officers, soldiers, and civilian employees of the government are also maintained where the number needing such instruction is sufficient, and where schools outside the post are not available; at these schools the attendance for the children of officers is optional, and for the children of non-commissioned officers and men compulsory. The government supplies all the books necessary. There is also a post school for officers, systematic intruction now being an important feature of an officer's training. See MILITARY EDUCATION.

## ARMY WORM



MOTH, LARVA AND PUPA; with caterpillar in various stages of development.

## AMBROSIA BEETLES




1. BEETLES (Xyleborus dispar): Male and female, enlarged, and antenna of female more enlarged.
2. AMBROSIA of Corthylus punctatissimus: *a*, detached dumb-bell shaped pairs of cells greatly enlarged.
3. GALLERIES of Corthylus punctatissimus in huckleberry roots; enlarged.
4. GNATHOTRICHUS MATERIARIUS.
5. GALLERIES of Monarthrum mali in maple, showing brood cells (at the right).

**AR'MY-WORM'** (so named from traveling in great numbers). In the northern United States the yellow-striped lava or caterpillar of a dark-gray moth (*Leucania unipuncta*), a species closely related to the cutworms. (See Plate of ARMY-WORM.) The army-worm is always present in the United States, but only occasionally becomes numerous enough to do much damage. During an early dry spring it may increase in numbers so that it is obliged to march—i.e., to go in search of food. It usually feeds on grass, but may destroy fields of grain and Indian corn. The term is frequently applied to other caterpillars of occasional prevalence and harm in fields, especially the so-called "fall" army-worm (*Laphygma frugiperda*), elsewhere described as GRASS-WORM. Consult *Third Report United States Entomological Commission* (Washington, 1883).

**ARNA,** är'nȧ (Hind. fem. *arnī*). The Indian buffalo. See BUFFALO.

**ARNABOLDI,** är'nȧ-bōl'dē, ALESSANDRO (.827–98). An Italian lyric poet. He was much admired for his *Versi* (1872), his *Poeti d' azione,* and his *Nuovi versi* (1888), remarkable for the æsthetic quality of the descriptive passages, especally in the long series of poems, in the manner of Carducci, devoted to Greece and Sicily. For translations, see E. Lee Hamilton's *Poems and Transcripts* (Edinburgh and London, 1878), and E. A. Greene, *Italian Lyrists of To-day* (New York 1893). Consult *Quarterly Review,* October 1877. There is a Czech translation by Vrchlicky.

**ARNASON,** är'nȧ-son, JON (1819–88). An Icelandic writer, born at Reykjavik, Iceland. He is called the Grimm of Iceland because of his collection of *Popular Legends and Tales of Iceland* (2 vols., 1862–64), and other folklore of his country, of which he was for many years the national librarian. The collection of popular tales is extensive and faithful to oral tradition. It is one of the most valuable in any literature and has become a classic handbook to students of comparative folklore. Stories from his collection have been translated into Danish, Norwegian, German, English, and French.

**ARNAUD,** är'nō', EMILE (1864—). A French economist and for many years an ardent advocate of peace. He was born at La Chapelle, France. As editor of *Les Etats-Unis d'Europe* over a long period, and as a delegate to all the international peace congresses, which began in 1889, he became so important a figure as to be chosen in 1891 president of the Ligue Internationale de la Paix et de la Liberté and in 1903 president of the Twelfth Peace Congress. He was also tendered the vice-presidency of the Bureau international permanent de la Paix, de Berne. Arnaud's reputation was largely increased by his writings and lectures in behalf of international peace.

**ARNAUD,** FRANÇOIS THOMAS DE BACULARD D' (1718–1805). A French author. While a student at the College of Harcourt he dedicated a play to Voltaire, who thenceforth took a lively interest in his welfare. For two years (1748–50) he was the literary correspondent of Frederick the Great in Paris. He went to Berlin in 1750, and afterward to Dresden, where he became counselor of the French legation. On his return to France he published a series of novels and romances entitled *Epreuves de sentiment* (12 vols., 1772–81). These works were very popular in their day and were highly praised by Rousseau, who declared that "other writers employed their head and their hands, but Arnaud worked from the heart." A complete edition of Arnaud's novels, romances, dramas, and other writings appeared at Paris in 1803.

**ARNAUD,** HENRI (1641–1721). The historian of the Vaudois, pastor, and soldier. Born in France, his family returned to Piedmont, while he was still a youth. Encouraged by the English Revolution and the enthronement of William III and probably with pecuniary assistance from England, Arnaud undertook to bring back to their native valleys the Vaudois expatriated by Victor Amadeus of Savoy. In September, 1689, he led about 1000 of the exiles into the valley of the San Martino and overcame a superior force; but being in danger of attack by French troops, he retired to the high tableland of the Balsille, making such fortifications as he could. Here he was assaulted, May 2, 1690, by the allied armies of France and Savoy under Marshal Catinat, numbering, as he says, 22,000 men, although Catinat's actual force was probably much smaller. The attack was heroically repulsed without loss to the Protestants, while the allied troops lost heavily. Arnaud did not risk another fight, but withdrew to Angrogna, and, just when final capture seemed assured, he learned that war had begun between France and Piedmont, and that the Piedmontese King had suddenly become a friend of the exiles, ready to receive them. The Vaudois were at peace in their valleys for a brief space only. In the latter part of the War of the League of Augsburg, from 1689 to 1697, Arnaud and his men did good service against France; but when that was over, the King of Piedmont again leagued with France against them, and 3000 Vaudois were expelled, finding an asylum in Württemberg. Arnaud was invited to England by William III, but preferred to remain pastor among his exiled countrymen at Schönberg, where he wrote his *Histoire de la glorieuse rentrée des Vaudois dans leurs vallées* (1710), dedicated to Queen Anne. Consult Mason, *History of the Waldenses* (London, 1875).

**ARNAULD,** är'nō', ANGÉLIQUE (DE SAINT-JEAN) (1624–84). A daughter of Robert Arnauld d'Andilly, born in Paris, Nov. 24, 1624. She became a nun at Port-Royal-des-Champs in Paris, where she had been educated by her aunt, Jacqueline Marie Angélique Arnauld, sister of the great Arnauld. She was made sub-prioress (1653), and on removing some years later to Port-Royal-de-Paris she held the same office. During the persecution of the Port Royalists, because they were strong Jansenists (see JANSENISM), Angélique Arnauld, by her piety and courage, sustained the spirit of the sisterhood. They were scattered, and when reunited they were watched by soldiers, lest they should hold communication with persons outside of the convent. In 1669, however, was issued the edict of Clement IX for the peace of the Church, which was a kind of compromise on this vexed question of Jansenism and Jesuitism. The nuns received back the privileges of which they had been stripped and constituted their society anew. Angélique Arnauld was again elected prioress. In 1678 she was made abbess. The next year her protectress, the Duchesse de Longueville, died, and the persecution recommenced by the prohibition to receive any more novices. Still Angélique did not despair. She consoled the nuns and exerted all her influence with persons in power, but with little effect. She died on Jan. 29, 1684, leaving behind her a bright and beautiful memory. She

was learned without being pedantic, pious without bigotry, and gentle to others in proportion as she was severe to herself. Angélique Arnauld wrote several works, the most valuable of which is *Mémoirs pour servir à la vie de la Mère Marie Angélique Arnauld de Sainte Madeleine, réformatrice de Port Royal* (Paris, 1742). For her life, consult Martin (London, 1876), and R. Monlaw (Paris, 1901).

**ARNAULD,** ANTOINE (1560–1619). An eloquent French advocate, born at Paris. His zealous defense of the University of Paris against the Jesuits, in 1594, won for him a wide celebrity and secured their temporary banishment. The Jesuits accused him of being a Huguenot, but the accusation seems to have been unfounded, for he displayed no personal predilection in favor of Protestantism as a distinct religious system. He had 20 children, some of whom formed the nucleus of the Jansenists and Port Royalists. He published *Le franc et véritable discours au roi sur la rétablissement qui lui est demandé des Jésuites* (1602).

**ARNAULD,** ANTOINE (1612–94). A French theologian and polemical writer, known as the great Arnauld. He was born at Paris, Feb. 6, 1612, and was the son of Antoine Arnauld, the celebrated jurist, from whom the younger Antoine seems to have inherited his vigorous intellect and that animosity for the Jesuits which characterized almost his entire life. After a thorough training in the liberal arts Arnauld began the study of law, but, in compliance with his mother's wishes, he abandoned his legal studies for theology. He became a priest in 1641 and in 1643 was made a member of the Society of the Sorbonne. He had previously made a thorough study of the works of St. Augustine, whose doctrine of sin and grace especially recommended itself to him. In 1643 he published a work entitled *De la fréquente communion*, which at once drew upon him the hostility of the Jesuits and plunged him into a controversy with that society which lasted for nearly 40 years. Arnauld was by nature a controversialist. He was iron-willed, passionate, narrow, erudite, and firmly convinced of his own infallibility. The defense of truth, as he conceived it, was the sole object of life, and in the defense of truth he spared neither himself nor his friends, nor, it must be confessed, truth itself at times. Within the Church he carried on a fierce polemic against the Jesuits; without, he wrote against the Calvinists and Freethinkers. His indefatigable ardor is illustrated by a characteristic reply made in his old age to his friend Nicole, who urged that, after many years of conflict and exile, the aged man should seek some rest. "Rest!" he retorted, "have I not all Eternity to rest in?" The controversy which began with *De la fréquente communion*, in 1643, was continued in the *Théologie morale des Jésuites*. Upon the outbreak of the Jansenist controversy (see JANSENISM), Arnauld took the field against his hereditary enemies. In 1641 he published a series of tractates against them, and these were followed, after intervals of peace, by new attacks in 1649 and 1656. In the last year the Jesuits succeeded in bringing about his expulsion from the Sorbonne. Since 1648 he had been living at Port-Royal-des-Champs, in friendship with Nicole, and with the great Pascal, the material for whose *Provincial Letters* Arnauld is said to have supplied. After the Jansenist controversy had been set at rest by the Peace of Clement IX, in 1668, Arnauld came into conflict with the Calvinists, whom he attacked in his *La perpétuité de la foi de l'église catholique défendue* (1669), written in collaboration with Nicole and followed by *Le renversement de la morale de Jésus-Christ par la doctrine des Calvinistes* (1672), and *L'impiété de la morale des Calvinistes* (1675). Although he enjoyed for a time the protection of Louis XIV, and seems to have been in close touch with the powers at Rome, Arnauld, in 1679, was forced to flee to Belgium owing to the unrelenting hostility of the Jesuits. In exile the old man continued his feverish activity. After 1680 he plunged into a bitter controversy with his old friend Malebranche, concerning the latter's theory of grace. In 1681, too, he published a defense of the English Catholics in reply to the accusations brought against them in connection with the Titus Oates episode, in which Arnauld strangely enough took up the cause of his ancient enemies, the Jesuits. He also wrote a book directed against William of Orange, calling him "a new Absalom, a new Herod, a new Cromwell" (1689). He died Aug. 8, 1694, near Liége, shortly after he had written a work entitled *Réflexions sur l'éloquence les prédicateurs*. The title of the "great Arnauld" was given him by the Jansenists, one of whose foremost champions he was. His voluminous writings, comprising over 100 volumes in their original editions, were published in 48 volumes at Lausanne (1775–83), the last volume being a biography of Arnauld.

**ARNAULD,** JACQUELINE MARIE (1591–661). A French abbess, usually called by her conventual name, Marie Angélique de Sainte Madeleine. She was the daughter of the celebrated advocate, Antoine Arnauld. In her nine year she assumed the dress of a novice; and concealing her age, her father induced the Pope to nominate her abbess of Port-Royal-des-Champs when she was a little over 11 years old. At first she longed for the freedom of the world. But in 1608 a sermon fully converted her. She then established discipline of especial severity and became famous for her piety. Like the rest of her family, she was a Jansenist. She was afterward superior of a new religious community in Paris; then prioress at Port-Royal, where her sister Agnes was abbess. She died in the convent of Port-Royal, Paris. Consult her life by Frances Martin (London, 1873).

**ARNAULD D'ANDILLY,** ROBERT (1588–1674). A French writer, born in Paris. He was the eldest son of Antoine Arnauld, the advocate, and brother of the great Arnauld, and was a person of considerable consequence at the French court, where his influence was beneficial, owing to his great power in controlling the pientious Anne of Austria. At the age of 55 he retired to the solitude of Port-Royal-des-Champs, where he devoted himself to religious history and biography. His chief works are translations, such as those of the *Confessions de Saint Augustin*, written in cameo-like French, and his *Vies des Saints Pères du désert* (1668, translated into English as *Lives of the Fathers of the Desert* (1757). He also wrote some religious verse.

**ARNAULT,** är'nō', ANTOINE VINCENT (1766–1834). A French poet and dramatist. He was born in Paris, Jan. 1, 1766, and died at Goderville, Sept. 16, 1834. He is remembered for his satirical fables, for his *Souvenirs d'un sexagénaire* (4 vols., 1833), which contain many interesting facts concerning the inner history of

France up to 1804; and, most of all, for several graceful poems, one of which, "La Feuille," is known to every French school-child. He first obtained celebrity through his tragedies, *Marius à Minturnes* (1791) and *Lucrèce* (1792), and he wrote the libretti to Méhul's operas, *Horatius Coclès* and *Phrosine et Mélidore*. His tragedy, *Les Vénétiens*, was produced at the Théâtre Français, in Paris, Sept. 12, 1798, and was very successful. Upon the second restoration of the Bourbon dynasty Arnault was officially included in the proscription of 1816 and fled to Belgium, where he wrote his two books of fables. These books, together with six others of a similar nature, written in 1813, were published in 1826 under the title of *Fables et poésies*. Arnauld was a representative of classicism and a pronounced opponent of the Romantic school. (See ROMANTICISM.) In 1819 he collaborated with Jay. Jouy, and De Norvins in the publication of the once famous *Biographie nouvelle des contemporains* (8 vols., 1820–25). In recognition of his celebrated biography, *Vie politique et militaire de Napoléon* (2 vols., 1822–26), a work full of curious facts and piquant revelations, Napoleon, while at Elba, settled upon the author a legacy of 100,000 francs. The works of Arnault were edited by himself in 1818, 1823, and 1827. All of these editions are somewhat incomplete.

**ARNDT**, ärnt, ERNST MORITZ (1769–1860). A distinguished German poet and patriot. He was born at Schoritz, which was then in Sweden, Dec. 26, 1769. His father had been a serf, but achieved a sturdy peasant independence, and designed Arndt for the ministry. He has described his early years delightfully in *Märchen und Jugenderinnerungen* (1818). He studied at Greifswald and Jena and was influenced especially by Goethe, Fichte, Klopstock, Bürger, and Voss. After he left the university he made journeys in Austria, Hungary, France, and Italy, and published an account of these travels in 1802. The first of his many political services was rendered in his book, *Versuch einer Geschichte der Leibeigenschaft in Pommern und Rügen* (1803), which contributed greatly to the mitigation and partial abolition of serfdom. He became privatdocent at Greifswald in 1880, and was made professor there in 1806. After the battle of Jena he fled to Sweden, whence he continued stirring appeals against Napoleon, under the title *Der Geist der Zeit*. He returned after three years to his professorial work. In 1812 he sought refuge in Russia, called thither by Baron von Stein, the great German statesman, who was there organizing the agitation against Napoleon. Arndt's finest poems—among them "Was ist des Deutschen Vaterland," and "Der Gott der Eisen wachsen liess"—belong to this period; also stirring appeals in prose, such as *Deutscher Volkskatechismus* (1812); *Was bedeutet Landwehr und Landsturm?* (1813); *Der Rhein, Deutschlands Strom aber nicht Deutschlands Grenze* (1813); collated in *Schriften für und an meine lieben Deutschen* (3 vols., 1845). After the French disaster in Russia (1812), he returned to Prussia, in which his hopes of German unity centred, and gave himself up to the agitation that resulted in the War of Liberation, which culminated in the battle of Leipzig (1813). In 1817 he married a sister of the great liberal preacher and philosophic theologian, Schleiermacher, and in 1818 was made professor of history in the newly established university at Bonn. As his liberal views were at variance with the government's reactionary policy, he was soon suspended (1820) and passed the next 20 years in honorable and honored retirement, writing historical essays of minor value, and his interesting *Erinnerungen aus meinem aussern Leben* (Leipzig, 1840). On his accession to the Prussian throne, Frederick William IV restored Arndt to his professorship (1840). German unity was still his dream. He took a lively interest in the events of 1848 and was one of the deputation to offer to the Prussian King the Imperial Crown of Germany. The ninetieth birthday of Father Arndt, as he had come to be called, was celebrated throughout his still disunited country; a month later he died at Bonn, Jan. 29, 1860. Eleven years later the ideal of his life was realized by the proclamation of the German Empire at Versailles. Arndt was neither a great scholar nor a great poet, but he was a noble character and a manly patriot. Editions of his war songs are numberless. His *Erinnerungen* form the basis of E. M. Seeley's *Life and Adventures of E. M. Arndt* (1879). There are German *Lives* by Schenkel (2d ed., Elberfeld, 1869); Langenberg (Bonn, 1869); and Baur (Hamburg, 1882); R. Thiele (Gütersloh, 1894); G. Lange, *Der Dichter Arndt* (Berlin, 1910); P. Meinhold, *Arndt* (Berlin, 1910); and a volume of Arndt's *Letters to a Friend* (*Briefe en eine Freundin*), edited by Langenberg (Berlin, 1878). The publication of his *Works* was begun in 1892 by H. Rösch and H. Meisner.

**ARNDT**, or **ARND**, JOHANN (1555–1621). A German Lutheran divine. He was born at Ballenstedt, Anhalt, Dec. 27, 1555, and was educated at Helmstedt, Wittenberg, Strassburg, and Basel. He became pastor at Badeborn, Anhalt, in 1583, but was deposed in 1590 because he resisted the order of Duke John George to remove the pictures from his church and cease the use of exorcism in baptism. Later that year he was appointed to a place at Quedlinburg, but was glad to leave it in 1599 and go to Brunswick, because he had fallen into disfavor with the townspeople. His ardent piety was an offense to the dead orthodoxy of his associates, and he welcomed the call to Eisleben (1608), but only stayed until 1611, when he became general superintendent at Celle, Hanover, and there died, May 11, 1621. His enduring fame rests upon his *True Christianity* (Magdeburg, 1610) and his *Garden of Paradise* (Magdeburg, 1612); new editions of both, with biographical sketch by F. W. Krummacher (2d ed., Leipzig, 1850); best English translation of the former is that edited by Charles F. Schaeffer (Philadelphia, 1868); of the latter there is an English translation by A. W. Boehm (London, 1716). Arndt nourished his soul upon the Scriptures and the mystics, and his works develop that spirit which afterward was called pietistic. (See PIETISM.) For his biography consult F. Arndt (Berlin, 1838), and the Krummacher sketch quoted above.

**ARNDT**, WILHELM (1838–95). A German historian. He was born at Lobsens, province of Posen, Prussia, and after studying history at the University of Göttingen became established at the University of Leipzig. He published, in addition to other writings, *Kleine Denkmäler aus der Merowingerzeit* (1874), and *Schrifttafeln zur Erlernung der lateinischen Paläographie* (1874; 3d ed., 1897–98). He was for many years collaborator on the *Monumenta Germaniæ Historica*, and in 1881 published at Leipzig a

second edition of *Goethes Briefe an die Gräfin Auguste zu Stolberg.*

**ARNDTS VON ARNESBERG,** ärnts fŏn är'nĕs-bĕrk, Ludwig (1803–78). A German jurist, who did much to develop the science of jurisprudence. He was born in Arnsberg, Prussia, and was successively professor of jurisprudence in Bonn, Breslau, Munich, and Vienna universities, being at the last institution from 1855 until his death. He favored warmly Austria's claims for admission to the German Empire and used his influence to that end in 1848, when in the National Assembly of Frankfort. He was knighted by Austria in 1871. His best known works are the *Lehrbuch der Pandekten* (14th ed., 1889); the *Juristische Encyclopädie und Methodologie* (9th ed., 1895); *Die Lehre von den Vermachtnissen* (3 vols., 1869–75); *Gesammelte zivilistische Schriften* (3 vols., 1874). He collaborated with Bluntschli and Pözl on an eight-volume work called *Kritische Uberschau der deutschen Gesetzgebung und Rechtswissenschaft* (1854).

**ARNE,** ärn, Thomas Augustine (1710–78). An eminent English composer. He was born in London, and received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar, but the love of music was too strong to be restrained. Young Arne became skillful as a violin player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterward celebrated as Mrs. Cibber) to cultivate her excellent voice. He wrote for her a part in his first opera *Rosamond,* which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas;* and afterward his *Comus* (1738), which displayed greater cultivation of style. He married a singer, Cecilia Young (1736), and after a successful visit to Ireland was engaged as composer to Drury Lane Theatre and wrote many vocal pieces for the Vauxhall concerts. The national air "Rule Britannia," which was originally given in a popular performance, the masque of *Alfred,* is of his composition. He composed also two oratorios, *Abel* and *Judith,* a number of operas, including *Artaxerxes,* in the Italian style (1762). His genius was better adapted to simple pastoral melody than to great dramatic compositions, and he wrote many glees, catches, canons, and songs, and the music to Garrick's "Ode to Shakespeare" for the Jubilee at Stratford-on-Avon in 1769. His son, Michael (1741–86), was also a composer. He died in London. Consult W. A. Barrett, *English Glee and Part Songs* (London, 1886); Horner, *Life and Works of Dr. Arne* (London, 1893).

**ARNETH,** är'nĕt, Alfred, Ritter von (1819–97). An eminent Austrian historian. He was born in Vienna, and after completing a course of legal studies entered the Austrian government service as an employee in the Imperial archives at Vienna. In 1848 Arneth was sent to the Frankfort Parliament as a representative from the district of Neunkirchen, and in 1861 was elected to the Diet of lower Austria. In 1868 he was appointed director of the state archives and in 1869 he was nominated by the Emperor a life member of the Austrian Upper Chamber. In 1879 he was chosen president of the Imperial Academy of Sciences at Vienna. Arneth wrote a number of scholarly works on eighteenth-century Austrian history, especially the eventful reign of Maria Theresa. His chief works are: *Geschichte Maria Theresias* (10 vols., 1863–79); *Prinz Eugen von Savoyen* (3 vols., 1858–59); *Joseph II und Leopold von Toscana, ihr Briefwechsel* (2 vols., 1872); *Marie Antoinette: Correspondance secrète entre Marie Thérèse et le comte de Mercy-Argenteau* (3 vols., 1874). He also edited the correspondence between Joseph II and Catharine of Russia (1869); miscellaneous letters of Maria Theresa (1881), and wrote as well an interesting autobiography, *Aus meinem Leben* (Vienna, 1891).

**ARNETH,** Joseph Calasanza, Ritter von (1791–1863). An Austrian numismatist and archæologist, born at Leopoldschlag, upper Austria. He became custodian of the Cabinet of Coins and Antiques in Vienna, and director of that institution in 1840, in which capacity he rendered very valuable services to the department of numismatics. Among his more important works are: *Synopsis Numorum Græcorum* (1837); *Synopsis Numorum Romanorum* (1842); *Das k. k. Münz- und Antikenkabinett* (1845); *Die antiken Kameen des k. k. Münz- und Antikenkabinetts* (1849); *Die Cinque-Cento-Kameen und Arbeiten des Benvenuto Cellini und seiner Zeitgenossen* (1858).

**ARNHEIM,** ärn'hīm. See Arnhem.

**ARNHEIM,** Hans Georg. See Arnim, Hans Georg.

**ARN'HEM** (anciently, Lat. *Arenacum*), or Arnheim. The capital of the Dutch province of Gelderland, on the Rhine, 35 miles southeast of Utrecht (Map: Netherlands, D 3). It is a place of historic interest and is situated in one of the most picturesque districts of Holland. It has elegant promenades constructed on the ramparts of the old city. One of its notable edifices is the Groote-Kerk, or Dutch Reformed Church, which was begun in 1452 and restored from 1895 to 1902. This has a tower 305 feet high and contains the tomb of the Duke of Gelderland, the opponent of Charles V. The town hall, erected in the fifteenth century and restored in 1898, is popularly called the Duivelhuis, from its grotesque decorations. Arnhem has a normal school for women, an art museum, the Museum van Oudheden en Kunst, and a public library. The trade of the town is with Germany, chiefly in grain and tobacco, while it manufactures furniture, wagons, mirrors, and scientific instruments. Arnhem was formerly the residence of the Dukes of Gelderland. In the thirteenth century and during the Middle Ages it was a member of the Hanseatic League. It was taken by the French in 1672, and stormed by the Prussians in 1813. Pop., 1900, 56,812; 1910, 65,685.

**AR'NICA** (commonly given as corruption of *ptarmica;* doubtful). A genus of plants belonging to the family Compositæ. The species are few in number and are found only in the north temperate and Arctic regions. The root and flowers of the mountain arnica (*Arnica montana*), sometimes called mountain tobacco, were formerly much valued in medicine, and were administered in various forms as a stimulant in paralytic affections, typhoid fevers, and other diseases. The drug is now rarely given internally, but in small doses it stimulates the digestion. Externally in the form of the tincture, arnica is a favorite household remedy for bruises, to relieve soreness and promote the absorption of extravasated blood. It is also used in the form of a plaster. The plant contains a peculiar volatile oil, a resin, caprylic and capronic acids,

tannin, and a bitter principle called arnicin. The root is perennial and crooked, the stem about 2 feet high, simple or little branched, with few leaves, bearing on the summit a head of flowers of dark golden yellow, often 2 inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is found, upon the continent of Europe, as far south as Portugal and as far north as Lapland. Other species have locally the same qualities attributed to them as *Arnica montana*. For illustration, see DICOTYLEDONS; FLOWER; ARNICA; ACACIA.

**ARNIM**, är'nĭm, COUNTESS VON (MARY ANTOINETTE BEAUCHAMP). An English writer. She married Count Henning August von Arnim, a German nobleman, who died in 1910. Her first book, *Elizabeth and her German Garden*, was published anonymously in 1898. The delightful picture which it gives of outdoor life in Germany and the charming vivacity of its style made it at once a great success in England and the United States. In similar vein is *The Solitary Summer*, brought out in 1899. Other volumes which followed, some novels, and some books of travel in the guise of fiction, include: *The Benefactress* (1902); *The Adventures of Elizabeth in Rügen* (1904); *The Princess Priscilla's Fortnight* (1906); *Fraulein Schmidt and Mr. Anstruther* (1907); *The Caravaners*, containing admirable characterization (1909); *Priscilla Runs Away* (1910).

**ARNIM**, är'nĭm, ELISABETH VON, better known as BETTINA (1785–1859). A sister of Clemens Brentano, and wife of Ludwig Joachim von Arnim, born at Frankfort-on-the-Main. She is noted chiefly for her friendship with Goethe (1807–11) and her pretended *Correspondence of Goethe with a Child* (*Goethes Briefwechsel mit einem Kinde*, 1835), which is in large part fictitious. Genuine sonnets of Goethe in it were addressed, not to her, but to Minna Herzlieb. As a work of fiction its merits are great. It is original, fresh, lively, and graphic, though with the usual romantic faults of construction and in its speculative pages it is unintelligible. A similar volume of correspondence with Caroline von Günderode (*Die Günderode*, 1840), is equally interesting as is also a collection of real *Letters* to and from her brother Clemens. In the *King's book* (*Dies Buch gehört dem Könige*, 1843) and its hardly intelligible continuation *Conversations with Demons* (*Gespräche mit Dämonen*, 1852), she advocated certain social reforms, such as the emancipation of the Jews. She was a true member of a brilliantly eccentric family, keen, witty, capricious, vain, untruthful. Her translation of her *Correspondence* with Goethe into English is one of the curiosities of literature. Her *Collected Works* were published in Berlin, 1853. Consult: M. Carrière, *B. v. Arnim* (Breslau, 1887); W. Oehlke, *B. v. Arnims Briefromane* (Berlin, 1904); M. Dege, *Bettina von Arnim* (Kiel, 1904).

**ARNIM**, är'nĭm, or **ARNHEIM**, ärn'hīm, HANS GEORG VON (1581–1641). A German general in the Thirty Years' War. He was born at Boitzenburg in Brandenburg. He fought under Gustavus Adolphus against Russia in 1613, served in the Polish forces, and in 1626 entered the Imperial service under Wallenstein and was appointed a field-marshal. Being a Protestant, he left the Imperial service on account of the Edict of Restitution, entered that of the Elector John George of Saxony, and was in command of the left wing of the army of Gustavus Adolphus at Breitenfeld (1631). He was one of the principal agents in the negotiations between John George and Wallenstein, which were terminated by the latter's death in 1634. After this he defeated the Imperialists at Liegnitz and operated in conjunction with Baner in Bohemia. In 1635 John George abandoned the Protestant cause, making peace with the Emperor Ferdinand II, and Arnim now left the Saxon service. He was seized by Oxenstierna in March, 1637, for alleged intrigues against Sweden, and was taken to Stockholm, but escaped to Hamburg in November, 1638, and thereafter devoted himself to freeing Germany from foreign domination. He was carrying on a campaign, as lieutenant-general of the Imperial and Saxon forces against the French and Swedes, when he died at Dresden, April 18, 1641. Consult: Helbig, *Wallenstein und Arnim* 1632–34 (Dresden, 1850); Irmer, "G. von Arnim als kaiserlicher Feldherr in Pommern und Polen," in *Forschungen zur deutschen Geschichte* (Göttingen, 1879), and *H. G. von Arnim, Lebensbild* (Leipzig, 1894). See THIRTY YEARS' WAR; WALLENSTEIN.

**ARNIM**, HARRY, COUNT VON (1824–81). A German diplomat, born at Moitzelfitz, Pomerania. He studied law and entered the diplomatic service; was appointed Ambassador to the Pope in 1864, and during the Vatican Council of 1869–70, as Ambassador of the North German Confederation, supported the German bishops who opposed the dogma of infallibility. He was made a Count in 1870, and during the next year took a prominent part in the negotiations preceding the Treaty of Frankfort. During 1872–74 he was Ambassador to France, but as he was opposed to the policy of Bismarck, the latter secured his transfer to Constantinople, and a little later caused him to be arrested on the charge of stealing and publishing State documents from the German Embassy in Paris. For this he was sentenced to nine months' imprisonment. But he escaped punishment by remaining outside of the Empire, chiefly in Austria, where he published *Der Munzio kommt* (1878), and *Quid Faciamus Nos?* (1879), two pamphlets on the German church situation. He also wrote two attacks on Bismarck entitled *Reichsglocke* and *Pro Nihilo*, attacking Bismarck. He died at Nice.

**ARNIM**, LUDWIG JOACHIM (ACHIM) VON (1781–1831). A German novelist and poet, born in Berlin. He is best known for a collection of folk songs made with Clemens Brentano, and published (1806–08) under the title of the initial song, *Des Knaben Wunderhorn*. He studied the natural sciences at Göttingen and Halle, and received the degree of M.D., but never practiced medicine. He married Brentano's sister, Bettina, in 1811. His first work, *Theorie der elektrischen Erscheinungen*, showed a leaning to the supernatural, common among the German romanticists, still more strongly marked in his *Hollins Liebeleben* (1802) and *Ariels Offenbarungen* (1804). *Der Wintergarten* (1809), a collection of romantic tales, was followed in 1810 by a striking novel, *Die Gräfin Dolores*. *Halle und Jerusalem* (1811) is a humorous romance, and *Isabelle von Ägypten* (1811) a mediocre novel. Two years later he collected his dramas. In 1817 he produced his last and best romance, *Die Kronenwächter*, a story of the days of Emperor Maximilian. His works are careless in form, incoherent in structure, and romantically whimsi-

cal, but they show a remarkable originality of invention. They were collected, with an introduction by Wilhelm Grimm, in 20 volumes (1839–48). There is a brilliant eulogy on Arnim in Heine's *Deutschland*. Consult R. Steig and H. Grimm, *Achim von Arnim* (Stuttgart, 1894), and M. Hartmann, *L. von Arnim als Dramatiker* (Breslau, 1910).

**AR'NO** (anciently, Lat. *Arnus*). One of the largest rivers in Italy, rising on Mount Falterona in the Apennines, at the eastern end of Tuscany, at an elevation of over 5000 feet (Map: Italy, E 4). Near Arezzo it is connected with the Tiber through the canalized portion of the Chiana, and near that place enters the Val d' Arno, one of the most fruitful and beautiful valleys of Italy. It passes Florence and enters the Mediterranean 6 miles west of Pisa. In former times that city was situated at its mouth. The entire length of the Arno is about 140 miles; its most important tributaries are the Chiana and the Sieve. It is navigable for barges as far as Florence. The Arno is subject to frequent rises and in some parts of its course the banks are protected by dykes.

**ARNO'BIUS**, called AFER. An early Christian writer sometimes called Arnobius the Elder. He lived about 300 A.D. and was a native of Numidia in Africa. He was a professor of rhetoric at Sicca and, although at first an opponent of the Christians, was early converted. His fame rests chiefly upon his treatise, in seven books, entitled *Adversus Nationes* (c.303 A.D.), which displays slight knowledge of Christianity, but is of interest as showing the arguments then employed in the conversion of heathendom. An English translation has been published under the title *The Seven Books of Arnobius against the Heathen* (New York, 1888). There is an edition of the original (Latin) text by Reifferscheid (Leipzig, 1875).

**ARNOLD**, är'nold, ABRAHAM KERNS (1837–1901). An American soldier. He was born in Bedford, Pa., graduated at West Point in 1859, was appointed a brevet second lieutenant in the same year, became a first lieutenant in 1861, and served with marked ability throughout the Civil War, being breveted captain in June, 1862, and major in May, 1864, "for gallant and meritorious services" at Gaines's Mill and Todd's Tavern, respectively. He received a regular major's commission in June, 1869, and became lieutenant-colonel in 1886 and colonel in 1891. Appointed brigadier-general in 1898, he commanded the second division of the Seventh Army Corps in Cuba during the war with Spain. He is the author of *Notes on Horses for Cavalry Service* (New York, 1869).

**ARNOLD**, BENEDICT (1615–78). A colonial governor of Rhode Island. He was born in England, but was brought by his father to America in 1636. He removed to Newport in 1653 and became first Governor of Rhode Island (under the new charter) in 1663 and was reëlected in 1664, 1669, 1677, and 1678. He seems to have built the celebrated windmill in Newport, whose erection was long ascribed to the Northmen. He was the great-grandfather of the better-known Benedict Arnold of Revolutionary days.

**ARNOLD**, BENEDICT (1741–1801). An American general known in the annals of the American Revolution as "The Traitor." He was descended from a prominent Rhode Island family and was born in Norwich, Conn., Jan. 14, 1741. He received a fair education, but, being ambitious and reckless, twice left his home and joined the Provincial troops on the northern frontier. In 1762 he established himself at New Haven, as bookseller and druggist, embarked in the West India trade, prospered, and in 1767 married Margaret Mansfield, a lady of good family, who died in 1775. On receipt (April 20, 1775) of the news of the battle of Lexington, Arnold led a military company to Cambridge and proposed an expedition to capture Ticonderoga and Crown Point, and was commissioned as colonel to raise troops in western Massachusetts, but was obliged to join as a volunteer the expedition under Ethan Allen, already on the way thither. Prevented by the Connecticut authorities from taking command of Ticonderoga after its capture, he armed a vessel and with a few troops took St. Johns, together with a royal sloop and several bateaux. Jealous persons in Connecticut prompted the Continental Congress to question his capacity and conduct, and, while planning the conquest of Canada, he was superseded, but was selected by Washington to head an expedition against Quebec. Late in 1775 he led 1100 men through the forests of Maine, enduring great hardships, and on December 3 was joined by General Montgomery. In the daring but unsuccessful assault, December 31, in which Montgomery fell, Arnold was wounded, but, recovering, took command at Montreal, Congress having made him brigadier-general. In June, 1776, he retreated by way of Lake Champlain and was immediately selected to construct and command a fleet to control that important body of water. On October 11, near Valcour Island, he attacked a British fleet twice the size of his own; held his position until night, and then, aided by the darkness, stole with his crippled flotilla between the enemy's lines and escaped.

In spite of Washington's confidence in Arnold, the latter's enemies influenced Congress, and in 1777 five of his inferiors in rank were made major-generals—a slight which his sensitive and ambitious nature could not forgive—yet at Washington's request he did not resign. The British having invaded Connecticut, he joined the militia raised to repel them, and at the battle of Ridgefield showed remarkable courage, barely escaping death. Congress now appointed him a major-general, but still denied him proper relative rank. He coöperated with Washington in opposing the advance of Howe toward Philadelphia, and was appointed to act with General Schuyler in checking the progress of Burgoyne through eastern New York. He raised the siege of Fort Schuyler (Stanwix), and at the battle of Bemis's Heights, Sept. 19, 1777, was recklessly prominent, but General Gates, who by intrigue had superseded Schuyler, became jealous of Arnold; a quarrel ensued, and Arnold was deprived of his command. Upon the earnest solicitation of his brother officers he remained with the army and, despite Gates's effort to keep him in the background at the second battle of Saratoga (October 7), he played a brilliant part in it and was severely wounded. Congress gave him a vote of thanks and at last his proper relative rank. In May, 1778, he joined the camp at Valley Forge, but, being incapacitated for active service, was placed in command of Philadelphia after the British retired. Here he married, April, 1779, Peggy (Margaret) Shippen, a beautiful and cultivated woman, youngest daughter of Edward Shippen, a loyalist, and afterward chief justice of the State. Moving in fashionable society

and living extravagantly, Arnold naturally incurred criticism, and to this the executive council of Pennsylvania added definite charges of arbitrary exercise of military authority and of favoritism to Tories. At his request a court-martial was appointed, but nearly a year elapsed before it was held (January, 1780), when he defended himself without counsel and was acquitted of intentional wrongdoing, but was sentenced to be reprimanded by Washington, who, while rebuking Arnold, urged him to regain the esteem of his countrymen; but this disgrace, added to the injustice of Congress and the feeling that his sacrifices of health and property were unappreciated, led Arnold to reconsider the overtures of treason made some months, if not years, before. In August, 1780, he took command of West Point, which through a correspondence with Major André (q.v.) he offered to surrender to the British; and to consummate the plan, Arnold and André met at midnight on the shore of the Hudson (September 21); but the capture of André, September 23, frustrated the scheme, and Arnold fled to the British sloop of war *Vulture*.

Having been made a brigadier-general in the British army, Arnold in December headed a naval expedition against Virginia, but did little besides destroying property along the James River and burning Richmond. In 1781 he led another expedition against Connecticut, which resulted in the burning of New London and the massacre of the surrendered garrison of Fort Griswold. In December, 1781, he sailed for England with his family, who were pensioned by the British government. He himself received £6315 (about $31,755) for his alleged losses in joining the British, was kindly treated by the royal family, and at the King's request prepared a plan for reconciling the colonies; but received either neglect or abuse from both political parties, and, failing to get a position in the army, was forced to take up his old trade of merchant. The years 1787–91 were chiefly spent at St. John, N. B., where he carried on trade with the West Indies, but he returned with his family to London in the summer of 1791. On the breaking out of the war between England and France he was exposed to great risks in prosecuting his West India trade, and on one occasion was captured by a French ship, but escaped with his customary daring. The government still refusing to give him active service in the army, he strove, by fitting out privateers against France, to recover his lost fortune, but being unsuccessful, weighed down by debt, and despised by two continents, he sank into a state of melancholy, and died June 14, 1801, regretting, tradition says, his treason.

His wife, who appears to have been guiltless of any complicity in his treason and who had great strength of character, died in 1804. By his first wife Arnold had three sons, and by his second wife, several other children. His eldest sons received commissions in the British army; and his second son by his second marriage, James Robertson, who inherited his father's daring and military ability, rose to be a lieutenant-general, was made aid-de-camp to King William IV and was created a knight. Others of Arnold's children held honorable positions, and one of his grandsons, Capt. William Traill Arnold, a brave fighter, was killed in the Crimean War. Consult: Sparks, *Life of Benedict Arnold* (Boston, 1838); Todd, *The Real Benedict Arnold* (New York, 1903); Arnold, *Life of Benedict Arnold* (Chicago, 1880). All the above must be used with caution.

**ARNOLD,** Bion Joseph (1861—). An American electrical engineer, born at Casnovia, Mich. He graduated from Hillsdale College in 1881 and took advanced work at Cornell and the University of Nebraska. After 1893, when he established himself as an independent consulting engineer, he became known throughout the country as a traction expert. Among numerous important undertakings where he was chief engineer or where his advisory services were employed, are the construction of subways in New York and Chicago, the rebuilding of the Chicago street railway system, and the electrification of the New York Central Railroad's approach to New York. In addition, he was employed at various times as consulting engineer by the Wisconsin State Railway Commission; by the cities of Pittsburgh, Providence, Los Angeles, San Francisco, and Detroit; and by numerous transportation systems. He invented various devices for use on electric railways and was a pioneer in the use of alternating current and single phase electric traction systems. In 1903–04 he was president of the American Institute of Electrical Engineers; and he also identified himself with other scientific societies, American and foreign.

**ARNOLD,** är'nôlt, Christoph (1650–95). A German peasant (born near Leipzig), who carried out interesting astronomical observations and wrote *Göttliche Gnadenzeichen, in einem Sonnenwunder vor Augen gestellt* (Leipzig, 1692). He constructed an observatory at his own house and devoted himself to astronomical studies. He was the first to observe the comets of 1682 and 1686 and observed the transit of Mercury in the fall of 1690. An account of the latter observation is given in the work before mentioned.

**ARNOLD,** är'nold, Sir Edwin (1832–1904). A popular English author, born at Gravesend, June 10, 1832. From King's School, Rochester, he went to King's College, London, and thence to University College, Oxford, where he won the Newdigate Prize for a poem in 1853. In 1854–56 he was master of King Edward's School, Birmingham; and in 1856 he became principal of the Government College at Poona, Bombay. Returning to England in 1861, he obtained a place on the editorial staff of the *Daily Telegraph*. At the death of Thornton Hunt he became chief editor of the paper. While at this exacting work he found time to translate a volume of Greek poems and to produce his best-known work, *The Light of Asia* (1879), a production notable for its lofty philosophy and the vividness and reality with which the scenery, climate, manners, and people of Hindustan, as they were 2000 years ago, are portrayed. Its full title is *The Light of Asia; or, The Great Renunciation; being the Life and Teachings of Gautama (as told in verse by an Indian Buddhist)*. He subsequently published *Pearls of the Faith* (1883); *The Gulistan* (1889); *Poems, National and Non-Oriental* (1888); *The Light of the World* (1891); *The Tenth Muse and other Poems* (1895); *East and West* (1896); *The Voyage of Ithobal* (1901), and numerous other works. He was made a Companion of the Order of the Star of India in 1877; a Knight Commander of the Order of the Indian Empire in 1888, and was decorated by the Sultan of Turkey and other Oriental rulers. He frequently visited the United States, reading there in 1891.

During the 10 years following the publication

of *The Light of Asia* Arnold attained his highest popularity. In the final estimate of his poetry it will be discovered that his immense vogue was due largely to the freshness of his subject. He, above all others, popularized the philosophy of India. He was excellent at translation and paraphrase, but lacked the creative genius of the greater poets.

**ARNOLD,** GEORGE (1834–65). An American poet and humorist, born in New York City. As a child, while living in Illinois, he showed talent for drawing and, on his return to the East, studied with a portrait painter in New York. He abandoned this career for literature, wrote several unimportant biographies, and contributed stories, poems, sketches, and critical essays to various periodicals, especially *Vanity Fair*, in which appeared the earlier of his once famous *McArone Papers* (begun in 1860). He served as a soldier in the Civil War. William Winter edited his *Poems* with a Memoir (Boston, 1870; new ed., 1889). Some of these are characterized by melodious sweetness and pathos, but recent anthologists pay slight attention to them.

**ARNOLD,** är'nŏlt, GOTTFRIED (1666–1714). A German theologian. He was born at Annaberg, Saxony, studied theology at Wittenberg, and in 1697 was appointed professor of history at Giessen. His chief work is his *Unparteiische Kirchen und Ketzerhistorie* (1699–1700), which, by reason of its spirit of toleration, may be said to have marked an epoch in church history. During his life he was constantly exposed to attacks from the orthodox party. His 53 other works include *Die erste Liebe* (1696; ed. by Lämmert, 1844), and *Die Verklärung Jesu Christi in der Seele* (1704). Consult Dibelius, *Gottfried Arnold* (Berlin, 1873).

**ARNOLD,** är'nold, ISAAC NEWTON (1815–84). An American lawyer and politician. He was born in Hartwick, N. Y., taught school, studied law, was admitted to the bar in 1835, and in the following year removed to Chicago, where he soon became prominent as a politician. Beginning in 1843, he served several terms in the Legislature. He was elected to Congress in 1860 and served for two terms, part of the time as chairman of the important committee on manufactures. He was also conspicuous as an advocate of the immediate abolition of slavery. In 1865 he was Auditor of the United States. For many years he was an intimate friend of Abraham Lincoln, and he published an able *Biography of Lincoln* in 1866 (4th ed., 1887). He also wrote what is probably the best *Life of Benedict Arnold* (1880). Consult E. B. Washburne, *Isaac Newton Arnold*, an address delivered before the Chicago Historical Society, of which Arnold was for many years president (Chicago, 1884).

**ARNOLD,** är'nŏlt, JOHANN. A miller of the Neumark (Brandenburg), who lived in the time of Frederick II of Prussia and became famous as the instigator of an extraordinary interference of that monarch with the ordinary processes of justice. Arnold complained to the King that his landlord, by making a pond, had taken away water from his mill; that he (Arnold) had therefore refused to pay rent for the mill, of which he held a lease, but had been condemned to pay by the unanimous decisions of two courts. The King, as the fountain of justice, took up the case and, regarding it as an oppression of the poor, arbitrarily reversed the decisions of the courts, dismissed his high chancellor, imprisoned several other officers of justice, and ordered that restitution should be made to the miller. Soon afterward the King died, and under Frederick William II the case was more coolly investigated, and the condemned officials were exonerated and recompensed for their losses by the State.

**ARNOLD,** JOHANN GEORG DANIEL (1780–1829). A jurist and poet of Alsace. He was born at Strassburg, studied there and at Göttingen and Paris and from 1806 to 1809 was instructor in French civil law in the law school at Coblenz. In the latter year he was appointed to the chair of history at Strassburg and in 1811 was transferred to that of Roman law. His great work in jurisprudence is the *Elementa Juris Civilis Justinianei cum Codice Napoleoneo et Reliquis Legum Codicibus Collata* (1812). He also wrote in High-German, "Blessigs Totenfeier," and numerous other lyrics, and in the Strassburg dialect, *Der Pfingstmontag* (1816), a comedy in rhymed Alexandrines, much praised by Goethe.

**ARNOLD,** är'nold, LEWIS G. (1815–71). An American soldier. He was born in New Jersey, graduated from West Point in 1837, and served as second lieutenant in the second Seminole War (1837–38). During the Mexican War, as first lieutenant in an artillery company, he accompanied General Scott's army and participated (1847) in all the operations from Vera Cruz to Mexico City. He was brevetted captain for bravery (August 20) at Churubusco, and major for gallant conduct (September 13) at Chapultepec. During the Civil War he helped repel the Confederate attack upon Santa Rosa Island (Oct. 9, 1861) and distinguished himself, as executive officer, in the defense of Fort Pickens during the bombardments of November, 1861, January, 1862, and May, 1862. He was then appointed brigadier-general of volunteers and commanded successively the department of Florida and the Union forces at New Orleans and Algiers, La., but was disabled by a stroke of paralysis (November, 1862), and was retired from the service, as lieutenant-colonel of regulars, in August, 1864.

**ARNOLD,** MATTHEW (1822–88). An English poet and essayist. He was a son of Dr. Thomas Arnold, the famous head master of Rugby, and was born Dec. 24, 1822, at Laleham, a village near Staines, in the valley of the Thames. With the exception of a year (1836–37) at Winchester under Dr. Moberly, later Bishop of Salisbury, Arnold passed his school days at Rugby, where his "Alaric at Rome" won the prize for poetry (1840). He was elected a scholar of Balliol College, Oxford, in November, 1840, but did not begin residence till October of the next year. In 1843 he gained the Newdigate Prize with a poem entitled "Cromwell," and in March, 1845, was elected a fellow of Oriel. Among his colleagues at Oriel were Dean Church, John Earle, subsequently known as professor of Anglo-Saxon in the university, and Arthur Hugh Clough, to whom Arnold has paid tribute in "Thyrsis," justly ranked with "Lycidas" and "Adonais," as one of the finest elegies in the language. After a short period of teaching the classics in the fifth form at Rugby, he became, in 1847, private secretary to the Marquis of Lansdowne, Lord President of the Council, who in 1851 appointed him an inspector of schools. This inspectorship he held until November, 1886. He appears ever to have felt repugnance toward the details of the official routine—the hearing of recitations by

students of training colleges and the correction of endless examination papers. Yet even here his influence was felt by the English public, and his annual reports, appearing from 1852 to 1882, aroused an interest seldom accorded to such publications. From 1857 to 1867 he was successor to Wharton and Keble in the more congenial post of professor of poetry at Oxford. It was then, by his famous series of prelections *On Translating Homer* and *On the Study of Celtic Literature*, that he began a reform of English criticism so important in the history of nineteenth-century literature. Three times, in 1859, 1865, and 1885, he was commissioned to visit the Continent for study of the school discipline and methods of education there in vogue; and in 1883–84 he came to the United States as a lecturer. The visit to America was repeated in 1886. As a lecturer he was disappointing, both because of his awkward manner and the feebleness of his voice, which was inaudible to the greater part of his audience. He died April 15, 1888, and was buried in the churchyard of All Saints at Laleham.

Like Dryden and Coleridge, Arnold gained high distinction both as critic and as poet. Even his prize poems, though not foreshadowing his later work, display more talent than is usual with a poet's first efforts. In "Alaric at Rome" (Rugby, 1840; reprinted, 1893), a difficult stanza is managed with skill; and the heroic verse of "Cromwell" is smooth and agreeable. In 1849, under the initial "A," he published *The Strayed Reveller and Other Poems*, containing the beautiful "Mycerinus" and "The Forsaken Merman." This volume was followed, still under "A," by *Empedocles on Ætna and Other Poems* (1852), where first appeared the narrative "Tristram and Iseult," and several lovely lyrics, such as "A Summer Night," "The Youth of Nature," "The Youth of Man," and "Faded Leaves." In 1853 Arnold threw off the mask of anonymity. The *Poems* of that year (3d ed., 1857) include "Sohrab and Rustum," his popular poem, founded upon a story in Firdausi's *Shah-Nameh;* "Requiescat," "The Scholar-Gipsy," and many pieces from the earlier collections. "Empedocles," however, was omitted as structurally weak. Time now singles it out as one of Arnold's most attractive dramatic poems. The songs of Callicles, the harp-player, are among his choicest lyrics. The volume was prefaced with an admirable statement of the author's aim—an essay since famous not only for its brilliancy, but also as suggesting a different field in which Arnold was to become well known. Arnold's other volumes of verse comprise *Poems*, Second Series (1855), of which the chief new poem is the magnificent episode "Balder Dead," and in which four songs of Callicles are grouped as "The Harp-Player on Ætna"; *Merope*, a rather frigid tragedy (1858); *New Poems* (1867), memorable for "Thyrsis," and containing "Empedocles on Ætna" revived; *Poems* (the first collected edition, 1869; reissued, 1877), in which was included "Rugby Chapel," that noble elegy on the death of his father; and a fine edition complete in three volumes (1885), containing "Westminster Abbey," a splendid elegy on Dean Stanley. In this edition Arnold classified his poems as Early Poems, Narrative Poems, Sonnets, Lyric Poems, Elegiac Poems, Dramatic Poems, and Later Poems—a division since carefully observed by his editors.

It will be noted that the bulk of Arnold's verse is relatively small—a fact doubtless to be attributed to the preoccupation of official duties. It is equally noticeable that throughout his body of verse a level of excellence is maintained so nearly invariable that at most there are perhaps not more than a round dozen titles which one would not regret to see removed. Although it can no longer with accuracy be said that Arnold is not a popular poet, it is nevertheless true that he does not appeal to the wide audience of Tennyson and Browning. His poetical work will, it is certain, have always a peculiar grace for not a few. In its grave and noble music as in its stoic austerity, it will claim its own fit audience.

But it is a question whether Arnold will not in time take a place as the third great poet of the Victorian age. On this point Arnold himself wrote: "My poems represent, on the whole, the main movement of mind of the last quarter of a century; and thus they will probably have their day as people become conscious to themselves of what that movement of mind is, and interested in the literary productions that reflect it. It might be fairly urged that I have less poetical sentiment than Tennyson, and less intellectual vigor and abundance than Browning; yet because I have, perhaps, more of a fusion of the two than either of them, and have more regularly applied that fusion to the main line of modern development, I am likely enough to have my turn as they have had theirs."

Among Arnold's prose writings are: *On Translating Homer* (1861–62), and the *Study of Celtic Literature* (1867), both redactions of Oxford lectures; *Essays in Criticism* (1865); *Culture and Anarchy* (1869); *St. Paul and Protestantism* (1870); *Literature and Dogma* (1873); *Mixed Essays* (1879); *Irish Essays* (1882); *Discourses in America* (1885); *Essays in Criticism*, second series (1888). Two volumes of his letters were published in 1895 under the editorship of G. W. E. Russell. These, though they are likely to add little to his literary fame, do, as the editor hoped they might, "reveal aspects of his character . . . which could be only imperfectly apprehended through the more formal medium of his published works." Besides all these, there are other theological and social essays, and reports and books on education. He also edited selections from Dr. Johnson (1878), Wordsworth (1879), Byron (1881), and Burke (1881), with noteworthy prefaces. Arnold's work in prose is not altogether uniform in value. Naturally what pertains to schools is of interest primarily to educators; although students of Arnold's style will find *A French Eton* (1864) a valuable document. Likewise much that he wrote on politics and theology, though it served its purpose, now possesses chiefly an historical value. *Literature and Dogma* and *God and the Bible*, the former of which he himself considered his most significant work, were in his own time much misunderstood. Their purpose was to assert the natural truth of the Christian religion as against its dogma, to emphasize the literary aspect of the Bible, and in the words of Mr. Brownell, to make "each a theme, a topic of literature"—a part of that generous culture of which he was so persuasive an advocate. Arnold was among the earliest thus to apply to these subjects the methods of literary criticism—he wrote of them in a style quite new in treatises of the sort; but he failed at the time to satisfy either orthodox or radical. His permanent place as a critic is

made secure by such volumes as the first series of *Essays in Criticism*. Not only is the thought here of the first order, but the style is of the best, ranking with that of Newman, his master. The essays follow the sympathetic method of Sainte-Beuve. Especially brilliant is the essay on Heine, an author from whom Arnold derived many of his ideas and the sting with which he attacked Philistinism, a term which he introduced into English from the slang of the German universities. The essay on "Pagan and Mediæval Sentiment" is a charming contrast between Greek and mediæval ideals as represented by Theocritus and St. Francis of Assisi. The Oxford lectures above referred to are now classics. Of the discourses delivered in America, the one on "Literature and Science" is a strong plea for literature against the encroachments of science; and the one on "Emerson," though clearly inadequate as an estimate, contains passages of great eloquence. Arnold's influence is still paramount in English criticism. Many of his phrases, such as "sweetness and light," "the great goddess Lubricity," the "lyrical cry," the definition of poetry as "a criticism of life," the contention that criticism should be "a disinterested endeavor to learn and propagate the best that is known and thought in the world," the description of conduct as "three-fourths of life," the phrase "the not-ourselves that makes for righteousness," the division of the British public into "Barbarians, Philistines, and Populace," the infusion of new meaning into the terms "Hebraism" and "Hellenism"—all these have become common property; but more, his general manner of treating literary themes very widely prevails. Even during his lifetime his judgments in this field were received as *ex cathedra*. He did away with the pompous rhetoric and blustering animosities of the eighteenth-century school, and substituted therefor restraint, poise, taste—in short, the ethical element. It was thus that he introduced into English criticism a new era. What Principal Shairp has happily called "the sparkling banter" of his occasional manner (for example, in *Culture and Anarchy*), has led to the ascription to Arnold by the careless and the unperceptive of a flippancy which, it is hardly necessary to state, was not characteristic of his temper.

**Bibliography.** Arnold, like Thackeray, expressed a wish that he should not be the subject of a biography. In fact, it is not his somewhat humdrum life that interests those who most admire him; and for biographical details, the reader may consult the charming *Letters* cited above. One may also refer to V. Scudder, *Matthew Arnold* (Boston, 1898); Garnett, *Matthew Arnold* (London, 1900); and Dawson, *Matthew Arnold* (New York, 1904). For his influence on education see Fitch, *Thomas and Matthew Arnold* (New York, 1897); and for the social aspect of his work, Robertson, *Modern Humanists* (London, 1891). For Arnold as a poet, see V. Scudder, *Neo-Paganism: The Poetry of Doubt* (Boston, 1897); R. H. Hutton in his *Literary Essays* (London, 1892); and Hunt, *The Poetry of Matthew Arnold* (New York, 1898). Good appreciations of Matthew Arnold in general are to be found in Galton, *Two Essays on Matthew Arnold* (London, 1897); Aronstein (Berlin, 1904); Saintsbury, *Matthew Arnold* (London, 1899); Woodberry in *Makers of Literature* (New York, 1900); Brownell in his *Victorian Prose Masters* (New York, 1902); Paul, *Matthew Arnold* (London, 1902); Henry James, *Matthew Arnold's Essays* in his *Views and Reviews* (Boston, 1908); Chapman in his *English Literature*, pp. 423–459 (Boston, 1910); and Benson in *The Leaves of the Tree* (New York, 1911); Russell, *Matthew Arnold* (New York, 1904).

**ARNOLD,** RICHARD (1828–82). An American soldier. He was born at Providence, R. I., and graduated at West Point in 1850. He was made captain of an artillery company early in 1861, served with gallantry at Bull Run (July 21, 1861), at Savage's Station (June 29, 1862), at Port Hudson (May–July, 1863), and at Fort Morgan (August, 1864), and after various promotions was brevetted major-general of volunteers in August, 1865. On 1875 he became a major in the regular service, and in 1877 he was appointed acting assistant inspector-general of the Eastern Department. In 1882 he became a lieutenant-colonel.

**ARNOLD,** RICHARD (1845–1918). An American violinist. He was born in Eilenburg, Prussia, but received his first musical training in America where he had come as a child. His was a case of remarkable precocity. When only four years of age he received regular instruction on the violin, and entered upon the duties of leader of a theatre orchestra when a boy of 12. In 1864 he went to Leipzig, where he spent three years at the Conservatory and always stood at the head of the class. After his return to America he became a member of Theodore Thomas's orchestra. In 1877 he joined the New York Philharmonic Society, and three years later became the concert-master, which post he held without interruption until 1909. In 1878 he founded the New York Philharmonic Club, of which he was the director and solo violinist until 1891. He is also highly esteemed as a teacher.

**ARNOLD,** SAMUEL (1740–1802). An English composer. He was educated under Dr. Nares in the Chapel Royal, and when 23 years old was appointed to compose an opera for Covent Garden, and produced *The Maid of the Mill* (1765), which was successful. In 1776 he became composer for the Haymarket; in 1783 was appointed organist and composer to the Chapel Royal, and 10 years afterward organist in Westminster Abbey. He produced 43 dramatic compositions and his oratorios include *The Cure of Saul* (1767), *The Resurrection* (1773), and *The Prodigal Son* (1777). He edited an edition of Handel's works in 36 volumes, incomplete and faulty; but he is best remembered by his collection of *Cathedral Music* (1790).

**ARNOLD,** SAMUEL GREENE (1821–80). An American historian. He was born at Providence, R. I., graduated at Brown University (1841) and at Harvard Law School, and was admitted to the bar in 1845. He was Lieutenant-Governor of his State in 1852, 1861, and 1862, and was in the United States Senate from December, 1862, to March, 1863. He published an excellent *History of Rhode Island and Providence Plantations* (New York, 1859) and several addresses, including *The Spirit of Rhode Island History* (1853).

**ARNOLD,** SARAH LOUISE (1859—). An American educator, born at North Abington, Mass., and educated at the Bridgewater (Mass.) State Normal School. For some years after her graduation in 1878 she taught in the schools of several States and later became successively principal of a training school at Saratoga, N. Y., supervisor of schools in Minneapolis and in Bos-

ton, and dean of Simmons College. To the last-named position she was chosen in 1902; in the same year Tufts College conferred upon her an honorary M.A. degree. All of her numerous writings on educational subjects bear the stamp of wide experience coupled with ripe scholarship. Besides various other texts for schools and aids for teachers, she published: *Waymarks for Teachers* (1894); *Stepping Stones to Literature*, a series of excellent readers widely used in graded schools (1897 et seq.); *Reading: How to Teach It* (1899); *The Mother Tongue*, with G. L. Kittredge (1900); *Plans for Busy Work* (1901). Many of her writings have been printed in Spanish and Portuguese, as, for example, *Primeiro livro de leiture*, with G. C. Benajah (1911). In 1913 there was published a *Manual for Teachers* of which she was joint author.

**ARNOLD**, THOMAS (1795–1842). An English scholar and educator, best known as master of Rugby. He was born June 13, 1795, at West Cowes, Isle of Wight, where his father was collector of customs. Upon the death of his father in 1801, Arnold was put in charge of his aunt, Miss Delafield, with whom he remained for two years. At the age of eight he was sent to Warminster School in Wiltshire, whence, four years afterward, he was sent to Winchester. From this famous school at 16 he went up to Oxford as a scholar of Corpus Christi College, where he remained three years. Here he fell in with a small group of men, chief among whom were John Keble, the originator of the Tractarian movement and author of the *Christian Year*, and John Taylor Coleridge, afterward judge of the Queen's Bench, by whom he was greatly influenced. He took a first in classics in 1814 and in the following year was elected fellow of Oriel College, a position which he held for the next four years. In 1815 he took the Chancellor's Prize for a Latin essay and in 1817 the same prize for an English essay. It was during his residence at Oriel that he laid the foundation for his later work in the classics and history by wide reading along those lines, especially in Thucydides and Aristotle. Here, too, though at first reserved and shy, and later very disputatious in his maintenance of bold, if not very well-matured, opinions, he gained consideration and won distinction among the group of able men by whom he was surrounded.

He took deacon's orders in 1818 and in the following year left the university to settle at Laleham, near Staines, where he occupied himself chiefly in preparing pupils for the university and in the pursuit of his own studies. Here he spent eight quiet years, devoting himself particularly to the study of Thucydides and Roman history, in which he was profoundly influenced by the works of Niebuhr and other German historians whose influence was very apparent in his own writings. Here, too, he began his *History of Rome*. Besides these activities he devoted much attention to problems of the Church as well as to questions affecting the lower classes, and to practical work among the poor, all of which led to the maturing of ideas on Church and social problems that brought upon him fierce attacks in later years. His political opinions, affected by his life and work here, tended to crystallize into a form of advanced liberalism, which his opponents afterward characterized so bitterly as dangerous radicalism.

Any final estimate of Arnold must rest on his influence at Rugby. The head-mastership of Rugby fell vacant in 1827, and, though Arnold entered late in the contest and was not personally known to the electors, he was chosen for the position, largely, it would appear, on the recommendation of one of his friends, who predicted that if elected he would change the face of the public-school education throughout England. After being chosen in December, 1827, he took priestly orders and proceeded to the degrees of B.D. and D.D. He entered on his duties in August, 1828. The remaining 14 years of his life were spent at Rugby and at Fox How in Westmoreland, an estate which he bought in 1832, and his career was that of the school to which he devoted himself. Dr. Percival, successor of Arnold in 1887–95, afterward Bishop of Hereford, has said. "If I were called upon to express in a sentence or two my feeling in regard to Dr. Arnold's influence in school life, I should describe him as a great prophet among schoolmasters, rather than an instructor or educator in the ordinary sense of the term. . . . His influence was stimulative rather than formative, the secret of his power consisting not so much in the novelty of his ideas or methods, as in his commanding and magnetic personality and the intensity and earnestness with which he impressed his views and made them—as a prophet makes his message—a part of the living forces of the time."

Arnold was not the originator of any didactic system. In general, he accepted the system which he found, and infused into it a new meaning. Thus, without doing away with "fagging," he tempered it into a responsible supervision of the lower forms by the sixth form. He insisted upon the preëminence of classical studies, but enriched the ordinary school course of the day with mathematics, modern languages, and modern history. Above all, without its "accredited phraseology of piety," he emphasized the moral and spiritual interest. True scholarship he held to be associated with Christianity. He aimed, in the common lessons and in the weekly sermon, to mold the public opinion of the school. As the headmaster of Rugby, he looked as much to the development of manly character as to the training of students. His policy, in which he was eminently successful, was to send to the universities not a number of men trained to take firsts in the schools, but rather "thoughtful, manly-minded men, conscious of duty and obligation," who were almost certain to do uniformly well whatever they undertook. One immediate result was that, after the passage of the Reform Bill in 1832, Rugby men represented the best reform sentiment. His own character, his deep religious sense, his noble estimate of duty, of justice, of honesty, and of truth, were strongly impressed on the school. His great ability as an organizer and administrator of men and measures did much to work, at Rugby and elsewhere, the revolution which it had been predicted he would stir up in English education.

Profoundly religious, Arnold came naturally to take part in those theological discussions which attained prominence in the early decades of the last century. He wished to conserve the faith of the Church and also to liberalize its thought. The clergy of his time appeared to him negligent and apathetic; hence he welcomed the new life promised by the Oxford Movement and in 1829 published his pamphlets on *The Christian Duty of Conceding the Roman Catholic Claims*. But he soon perceived that for him dogma could not

be the sole basis of Christianity; and when, in 1836, the party in power at Oxford sought to keep Dr. Hampden from a professorship on a charge of heresy, he wrote for the *Edinburgh Review* an article of unsparing rebuke. For many years he was misunderstood by broad and by high churchmen alike. Because of the temper of his *Christian Duty*, the Archbishop of Canterbury refused to permit him to preach Bishop Stanley's consecration sermon. His *Edinburgh* article nearly cost him his Rugby post. But by 1840, with the passing of the first shock of the religious controversies of 1830–40 and with the lessening of his early strenuousness, as well as by the increasing recognition of his great work as master of Rugby, much of this friction passed away and his last years were full of honors. The honor most prized by him was his appointment by Lord Melbourne to the professorship of modern history at Oxford in 1841. His enjoyment of this was, however, very short. He died suddenly June 12, 1842.

His domestic relations were most happy. In 1820 he married Mary, youngest daughter of Rev. John Penrose, rector of Fledborough, Nottinghamshire, and sister of one of his school and college friends, Trevenen Penrose. The story of his relations with his family and friends forms one of the most tender and beautiful chapters in a life rich beyond that of most men in charm of personal associations. His four sons, who survived him, were Matthew; William Delafield (1828–59), director of public instruction in the Punjab and author of *Oakfield*, who is commemorated in Matthew Arnold's poem, *A Southern Night;* Thomas; and Edward Penrose (1826–78), a fellow of All Souls', Oxford, and an inspector of schools from 1866 to 1877.

Arnold endeavored to promote a better understanding between the poor and the well-to-do. He lectured before mechanics' institutes from May to July, 1831, published the *Englishman's Register* in aid of working people, and afterward, with similar purpose, contributed a series of articles to the Sheffield *Courant*. Some of the *Register* and *Courant* papers were reprinted by Stanley in a volume of *Miscellaneous Works* (1845). He was also a member of the senate of the University of London from 1836 to 1838, when he resigned because of disagreement with the majority of the members as to the requirements for degrees in Arts.

As a classical scholar, Arnold was deficient in the elegances of the eighteenth-century tradition. Regardless of style he viewed even the history of Livy with dislike. In the classroom his scholarship was most manifest in extemporaneous renderings. That he was well versed in the wider reaches of philological principle is shown by his three-volume edition of Thucydides (1830–35; 2d ed., 1840–42); although it is to be admitted that the value of that work lies chiefly in its exposition of those ideas respecting the essential continuity of history which, voiced in Arnold's Oxford inaugural, afterward determined the philosophy of Freeman. Dr. Arnold's literary fame rests finally upon his *History of Rome*, vols. i–iii (1838–42), which, as projected, was to terminate in the coronation of Charlemagne, but was not brought beyond the close of the Second Punic War. The history was based on the epochal *Römische Geschichte* (3 vols., 1811–22) of Niebuhr. It seems generally conceded that the representative portion of the work is that which offers what Archdeacon Hare has termed the first "adequate representation of the wonderful genius and noble character of Hannibal" (Stanley, chap. iv). Free from partisanship or paradox, dignified without being wearisome, the history is notable both for its finished style and its sound and extensive learning. That it attends closely upon the *ipse dixit* of the German authority has been regretted by many. His other works include a volume of lectures on the *Study of History* delivered at Oxford, six volumes of sermons, besides traveling journals and miscellany. His chief claim to remembrance must rest on his noble life and character. "His *Thucydides*, his history, his sermons, his miscellaneous writings, are all proofs of his ability and goodness. Yet the story of his life is worth them all." See the lines of his son, Matthew Arnold, in *Rugby Chapel*.

Consult: A. P. Stanley, *The Life and Correspondence of Thomas Arnold, D.D.* (Boston, 1860), the authoritative work on Arnold and one of the classics of English biography; Hughes, *Tom Brown's School Days* (London, 1857); Worboise, *Life of Dr. Thomas Arnold* (London, 1859); Fitch, *Thomas and Matthew Arnold and their influence on English Education*, "Great Educator Series" (New York, 1897); also, in German, Zinzow (Stettin, 1869) and Wittig (Hanover, 1884).

**ARNOLD,** THOMAS (1823–1900). An English scholar. He was the son of Dr. Thomas Arnold of Rugby, brother of Matthew Arnold, and father of Mrs. Humphry Ward, the novelist. He was educated at Rugby and Oxford, taking his degree in 1845, and became a colonial school inspector in Tasmania. He embraced Roman Catholicism in 1856 and joined John Henry Newman at Dublin. He became professor in the Roman Catholic university there and followed Newman to the Oratory at Birmingham. In 1865 Dr. Arnold temporarily abandoned the Catholic church, and removed to Oxford, being a lecturer and examiner there and at the Royal University of Ireland. After the death of his wife in 1888 he was more closely associated with Cardinal Newman. He published a *Manual of English Literature*, which has been widely used; edited old English texts, including Wyclif and Beowulf, and with the Rev. William Addis, the *Catholic Dictionary*. A few months before his death he published *Passages in a Wandering Life*, containing much of interest concerning Cardinal Newman and other friends famous in the Tractarian Movement.

**ARNOLD,** THOMAS KERCHEVER (1800–53). An English clergyman and author. He was born at Stamford, graduated in 1821 at Trinity College, Cambridge, and in 1830 was appointed rector of Lydon, Rutlandshire. He started and at different times edited the *Churchman's Quarterly Magazine*, the *Churchman's Monthly Companion*, and the *Theological Critic*, and published theological pamphlets and treatises, *Short Helps to Daily Devotion* (1847), and two volumes of sermons (vol. i, 1845; vol ii, posthumously, 1858). His reputation chiefly rests, however, on his large list of school books, including particularly an *English-Latin Lexicon* (with Rev. J. E. Riddle, 1847), based on a similar German work by C. E. Georges, and a *Practical Introduction to Greek Prose Composition* (1838), and a *Practical Introduction to Latin Prose Composition* (1839), both of which have in England been highly valued and have passed through numerous editions.

**ARNOLD,** WILLIAM ROSENZWEIG (1872—). An American Orientalist, born at Beirut, Syria. He graduated from Ohio Wesleyan University in 1892 and from Union Theological Seminary in 1895. From 1896 to 1898 he was curator of the department of antiquities in the Metropolitan Museum of Art in New York. He became a lecturer on the Old Testament (1902) and professor of Hebrew language and literature (1903) at Andover Theological Seminary, and while continuing in the latter position took up in 1908 a similar work at Harvard. His publications include *Ancient Babylonian Temple Records* (1896); *The Rhythms of the Ancient Hebrews* (1907).

**ARNOLD,** är'nôlt, YURIY VON (1811–98). A Russian composer. He was born at St. Petersburg, was an army officer from 1831 to 1838, and subsequently a member of the secret service. In 1839 he won the prize of the St. Petersburg Philharmonic Society for the best cantata with his *Svyetlana*. Subsequently he lectured on musical topics at Moscow and St. Petersburg, was a musical critic on the *Signale* at Leipzig from 1863 to 1868, and was appointed professor of vocal music in the Moscow Conservatory in 1870. His works include, besides the above-mentioned, an opera entitled *The Gypsy*, an *Overture to Boris Godunoff*, and many songs. In 1888 he became professor of the history of musical art at the Moscow University. His most important contributions to the literature of music are a *Theory of the Ancient Russian Church and Folk-Singing*, and *Is it Possible in Musical Art to Establish a Characteristically National School of Singing, and on what Data must it be Based?* published in the *Bayan* (St. Petersburg, 1888–89).

**ARNOLD-FORSTER,** HUGH OAKELEY (1855–1909). An English statesman and publicist. He was the son of William Delafield Arnold, the nephew of Matthew Arnold, and the grandson of Dr. Thomas Arnold. Educated at Rugby and at University College, Oxford, he studied law and was admitted to the bar, but after some years of practice relinquished it to enter the publishing house of Messrs. Cassell. In 1896 he was elected to Parliament from Belfast as a Liberal Unionist, and in 1900 he was made Parliamentary Secretary of the Admiralty. Soon after this he went to South Africa as chairman of the Small Land Settlement Commission. In 1903, immediately after accepting the portfolio of the War Office, he appointed a commission to report on a reorganization of the office; but his efforts to bring about a new army scheme were not supported by his colleagues, and before any practical steps could be taken the Unionist Parliament and government came to an end. Arnold-Forster was a profound student of military matters and a keen and efficient debater in Parliament. He wrote: *Things Old and New; Stories from English History* (7 vols., 1893–96); Our Home *Army* (1892); *A History of England* (1897); *Army Letters* (1898); *Our Great City* (1900); *The Army in 1906* (1906); *English Socialism of To-day* (1908); *Military Needs and Military Policy* (1909). Consult the *Memoir* by his wife (1910).

**ARNOLDI,** är-nôl'dē, ERNST WILHELM (1778–1841). A German manufacturer and financier. He was born at Gotha, established a dye works there and an earthenware manufactory at Elgersburg, and did much to encourage export trade. He was the chief promoter of the so-called Mercantile Institute of Gotha (1817), founded the Mutual Fire-Insurance Bank at Gotha (1821), and the Mutual Life-Insurance Bank, the first institution of the sort in Germany (1829). The beet-sugar industry was greatly extended by him. For his biography, consult Hopf (Gotha, 1878) and Emminghaus (Weimer, 1878).

**ARNOLDI,** WILHELM (1798–1864). A Bishop of Treves. He was born at Baden, Prussia, studied at the seminary of Treves, and was appointed pastor and capitulary of the cathedral church there in 1834. In 1839 he was elected bishop, but in consequence of governmental opposition, was not enthroned until 1842. It was his exhibition of the Holy Coat which, through the attacks of Ronge, gave the first impetus to the German-Catholic movement. He did much to promote Church art, and in matters of Church policy was a firm ultramontanist. For his biography, consult Kraft, *Wilhelm Arnoldi, Bischof von Trier* (Treves, 1865).

**AR'NOLD OF BRESCIA,** brā'shȧ (c.1100–55). An Italian cleric, born at Brescia, celebrated in connection with the movement for ecclesiastical reform in the twelfth century. He studied at Paris, probably under Abélard (q.v.), and attempted to apply the philosophical teachings of the latter to political conditions. Arnold of Brescia was possessed with the idea that he was destined to reform his age, and argued that the Church must revert to its apostolic poverty in order again to be virtuous. On returning to Brescia, he preached vigorously that the Church ought neither to own property nor to exercise temporal power. By his preaching the people of Brescia were exasperated against their bishop, and the revolutionary spirit spread widely. Consequently Arnold was banished from Italy. He retired to France, but, experiencing the bitter hostility of St. Bernard, who denounced him as an enemy to the Church, he took refuge in Switzerland. There he remained for about five years. In the meantime the people at Rome revolted, in 1143, against the papal rule and established a commune. Arnold proceeded thither and soon became leader of the populace. For 10 years the city was in a state of disorder and Eugenius III was obliged to flee from the city. These commotions were subdued by Adrian IV, who, feeling the weakness of his temporal authority, made use of the spiritual, and resorted to the extreme measure of laying the city under an interdict. The revolutionary party became discouraged and disintegrated. Arnold was obliged to take refuge with friends in Campania. On the arrival of the Emperor Frederick in 1155, Arnold was arrested and brought to Rome, hanged, his body burned, and the ashes thrown into the Tiber. Consult: Gregorovius, *History of the City of Rome in the Middle Ages*, vol. iv (London, 1896); Castro, *Arnoldo da Brescia e la rivoluzione del XII secolo* (Leghorn, 1875).

**ARNOLD OF WINKELRIED.** See WINKELRIED.

**AR'NOLDSON (FISCHOF),** SIGRID (1864—). A Swedish opera singer. She was born at Stockholm, studied under Madame Artôt in Berlin and Maurice Strakosch in Paris, and made her first appearance at Moscow, Russia, as Rosina, in *Il Barbiere di Siviglia*. She has a finely cultivated soprano voice of extensive range, and has been very successful as Mignon, Rosina, and Carmen. She sings regularly in the Italian opera at St. Petersburg and was a member of the

Metropolitan Opera House troupe in New York City during the season of 1893–94.

**ARNOLD VON LÜBECK,** är'nōlt fŏn lubĕk (?–1212). A German abbot and chronicler of the Middle Ages. He was abbot of the cloister of St. John at Lübeck and continued the *Slavic Chronicle* of Helmold from 1171 to 1209. This continuation, published frequently, may be found in the *Monumenta Germaniæ Historica*, vol. xxi; separately in the *Scriptores in Usum Scholarum* (1868); or, translated by Laurent, in the *Geschichtschreiber der deutschen Vorzeit* (1853; 2d ed., 1896). Consult Damus, *Die Slawenschronik Arnolds von Lübeck* (Lübeck, 1872).

**ARNOLFO DI CAMBIO,** är-nōl'fō dē kam'byō (c.1232–1302). The most notable Florentine architect of the Gothic period, perhaps one of its greatest sculptors. He was born at Colle, in Tuscany, and, according to traditional view, he was a pupil of the sculptor Niccola Pisano; and also came under the influence of the Roman school. But his architecture is unlike that of Niccola's school, or what one would expect of a sculptor, in that it lacks sculptural decoration. His earliest known architectural masterpiece is the important church of Santa Croce (q.v.) in Florence (begun in 1295), which shows that he excelled rather in conception and construction than in elaboration of details. When the cathedral of Florence was rebuilt (1296), its construction was intrusted to him, and he built a complete wooden model, which was esteemed the wonder of the age. After his death his plans were not followed above the first story, owing to the adoption of a more extensive plan. (See FLORENCE.) The famous Palazzo Vecchio there has been attributed to him, probably wrongly.

ARNOLFO DA FIRENZE, är-nōl'fō dä fē-rĕn'tsā. The preceding architect is usually identified with a very important sculptor, a pupil of Niccola Pisano, who assisted his master in the pulpit of Siena and elsewhere and appears in 1277 as sculptor to Charles of Anjou. His most important independent works are: the monument of Cardinal de Braye (d.1282), in San Domenico, Orvieto, which became typical for such monuments; the tabernacles of San Pietro fuori le mure, Rome (1285), the mosaic of which was probably by Pietro Cavallini, and St. Cecilia in Trastevere (1293); and the tomb of Boniface VIII in the Vatican grottoes. Venturi has attributed other works to him in Florence and elsewhere, the principal of which is the celebrated bronze statue of St. Peter with the Keys in St. Peter's, Rome, heretofore considered antique—a startling attribution, which lacks proof.

In the inscriptions of these works their sculptor is generally called Arnolfo da Firenze, whereas in Florentine documents the sculptor is called Arnolfo da Colle. For this, and for other reasons, Frey considers that the two cannot be identical, arguing also that the tomb of Pope Boniface VIII was executed at a time (1300) when the architect was occupied in Florence. But Venturi points out that the inscription on this tomb reads "Arnolphus architectus," and maintains the possibility of Arnolfo having kept up his Roman workshop until the tomb was completed. At all events, the sculptor in question was the most important of the older pupils of Niccola Pisano, and the principal representative of the classical tendencies of his school, as distinct from the more naturalistic represented by Giovanni Pisano. See PISANI. Consult "Arnolfo di Cambio," in Thieme and Becker, *Allgemeines Lexicon der bildenden Kunstler*, vol. ii (Leipzig, 1908); Venturi, *Storia dell' arte italiana*, vol. iv (Rome, 1906).

**ARNOLPHE,** är'nōlf'. A character in Molière's *Ecole des femmes*. He believes that all women of the world will make inconstant wives, and thus tells a friend, in the first act of the play, that he has been rearing a spouse for himself in the seclusion of the country—a peasant's daughter, Agnes by name. The succeeding action of the play shows that Arnolphe's theory is more sound than the preventive is efficacious.

**AR'NON.** A river issuing into the Dead Sea, the modern Wady Mojib. The main stream is only 13 miles long. The banks are lined with limestone and basalt rocks, some reaching the height of 1700 feet. The Arnon once formed the boundary line between Reuben and Moab. In Num. xxi. 14, 15, Arnon is said to be Moab's border, probably against Sihon's kingdom, whose advance to Arnon is also described in xxi. 28. It is referred to in the Mesha inscription; its fords are mentioned in Isa. xvi. 2, and it is referred to as Arnona (Arnonas) by Jerome. Schmidt explains the name as derived from *ranan*, characterizing the river as a "roaring" stream, and al Mojib as an Arabic translation. This explanation was accepted by De Goeje. The stream, which is perennial, has cut its way through a deep gorge. The mouth of the river, as one approaches it from the Dead Sea, is of extraordinary beauty and impressiveness. Beyond the last bend there are two waterfalls of inconsiderable height which, however, occasion a tremendous volume of sound because of the reverberation from the steep mountain walls. Schmidt and his party in 1905 went farther up the stream than Lynch (1848), De Luynes (1863), Rothe (1874), Hill (1897), Cady (1898), or Abel (1909), the other visitors; but no explorer has been able to follow the entire course of the river, either from above or below. For description and photographs, see N. Schmidt, "The River Arnon," in *Journal of Biblical Literature* (1906); and on the songs in Num. xxi. his *Messages of the Poets*, pp. 323 ff. (New York, 1911).

**AR'NOT,** WILLIAM (1808–75). A Scottish clergyman. He was born in Scone, was educated at Glasgow, was appointed pastor there in 1838 and at Edinburgh in 1863. He joined the Free Church Movement (1843) and in 1873 was a delegate to the meeting of the Evangelical Alliance at New York. His works have been much read and include *Illustrations of the Book of Proverbs* (1869) and *The Parables of Our Lord* (1870). Consult *Autobiography with Memoir by his Daughter* (London, 1877).

**AR'NOTT,** NEIL (1788–1874). A Scottish physician and physicist. He was born at Arbroath, Scotland, and was educated at the Grammar School of Aberdeen and at Marischal College in the same city. After studying medicine at Aberdeen he went to London in 1806 and soon entered the East India Company's service in China. In 1811 he returned to London and engaged in general practice. In 1836 Dr. Arnott participated in the foundation of the University of London and was appointed a member of its senate. He was afterward elected a fellow of the Royal Society and of the Geological Society. In 1837 he was appointed a physician extraordinary to the Queen. In 1823–24 Dr. Arnott was induced to deliver a course of lectures at the

Philomathic Institute on natural philosophy in its applications to medicine. The substance of these lectures formed the basis of his *Elements of Physics, or Natural Philosophy, General and Medical*, published in 1827. It is in connection with improvements in the warming and ventilating of houses that the name of Dr. Arnott became best known. In 1838 he published a treatise on *Warming and Ventilating*, and in 1855 another on *The Smokeless Fireplace, Chimney-Valves*, etc. He was the inventor of the "Arnott Stove" and "Arnott Ventilator," for which he received the Rumford Medal of the Royal Society in 1854. In 1861 he published *A Survey of Human Progress*, full of interesting and enlightened views on improvement generally. In 1864 appeared part i of the revision of the *Physics;* this was followed by part ii, which contained the subjects of optics and astronomy for the first time, and also an interesting supplement entitled *Arithmetic Simplified.* Arnott's last publication was a small work on national education. He was a liberal benefactor to the University of London and the various Scottish universities. For memorial notice, consult *Proceedings of the Royal Society*, vol. xxv (London, 1877).

**ARNOTTO** (probably the native name), or **ANNATTO** (also called ARNATTO and ANNOTTA; Ger. *Orleans;* Fr. *rocou*). A coloring matter of vegetable origin used to some extent in dyeing and calico printing; it is also used as a coloring ingredient in plasters, ointments, and in certain varnishes; farmers use it for coloring butter and cheese. It is made from the seed pellicle of an evergreen plant, the *Bixa orellana*, growing in Brazil, Cayenne, and several other places. To obtain it, the seeds of the fruit capsules are crushed and allowed to ferment in water; they are next rubbed upon a sieve, completely mashed, and the coloring matter washed away; after some time the water is decanted and the coloring matter allowed to dry in the shade. It is then broken up into cakes and wrapped in leaves. Urine is sometimes used to keep it from decomposing. Arnotto is insoluble in water; it dissolves with a red color in alcohol, in alkalies, and in fixed oils. It gives beautiful but fugitive shades; its employment in dyeing and calico printing is therefore limited. Indians prepare from it a paint for the body, used partly for the purpose of protecting themselves against mosquito bites; in South America it is largely used to improve the color and flavor of chocolate. The chief coloring principle of arnotto is a crystalline yellow substance called *bixin.*

**ARNOULD,** är'nōō', SOPHIE (1744–1802). A celebrated French actress and singer. She was born at Paris in the same room in the Rue de Bethisy in which Admiral Coligny was murdered. She made her début at the Grand Opera, Dec. 15, 1757, with splendid success. During a period of 21 years (1757–78) she was the most prominent and popular singer at the Royal Opera at Paris, one of her rôles being Iphigenia, in Gluck's *Iphigenia in Aulis*, which she was the first to interpret. Her voice was sweet and effective, her interpretation true to the intentions of the composer, her acting vivacious and graceful. She was not less remarkable for beauty and wit, and her home was frequented by such eminent scholars as D'Alembert, Helvetius, Diderot, and Rousseau. She has frequently been compared with Ninon de l'Enclos, and many of her epigrams and witticisms have been collected under the title of *Arnouldiana.*

**ARNOULD-PLESSY,** är'nōō'ple-sē', JEANNE SYLVANIE (1819–97). A French actress. She was born at Metz, and made her début at the Comédie Française as Emma in *La fille d'honneur.* Afterward she took prominent parts in *La passion secrète, Le verre d'eau, Julie*, and in many other successful plays. In 1845 she suddenly severed her contract and went to London, where she married J. F. Arnould, the dramatic author. Condemned by the French courts in the following year to pay damages to the amount of 100,000 francs (about $20,000), she went to St. Petersburg in 1846, where for nine years she was engaged at the Théâtre Français. She returned to Paris in 1855 and was again a member of the Comédie Française until 1876, her principal triumphs here being associated with the later dramas of Emile Augier. During her long histrionic career she is said to have created 53 distinct rôles.

**ARNPRI'OR.** A town of Renfrew Co., Ontario, Canada, on Chats Lake, at the junction of the Ottawa and Madawaska rivers, 38 miles by rail west of Ottawa, on the Canadian Pacific and the Grand Trunk railroads (Map: Ontario, G 2). It has large lumber and woolen mills, and marble works, and there are iron mines near by. The town owns its water works and sewerage system. The United States is represented by a consular agent. Pop., 1891, 3341; 1901, 4152; 1911, 4405.

**ARNSBERG,** ärns'bĕrK. The capital of the government district of the same name in the Prussian province of Westphalia (pop., 1910, 2,399,849), on the Ruhr, about 44 miles southeast of Münster (Map: German Empire, C 3). It has several churches, a gymnasium, a municipal hospital, a library, a public slaughterhouse, water works, and gas plant, and is the seat of the district government. Its principal article of manufacture is paper, and there are distilleries, breweries, and railroad repair shops. On a hill above the town stand the ruins of the ancient castle of the counts of Arnsberg. Near the castle is pointed out the spot where the chief tribunal of the Vehmgerichte (q.v.) was held. Between Arnsberg and Soest in the valleys of the Helve and the Möhne is a dam reputed to be the largest water-storage reservoir in Europe. (See DAMS AND RESERVOIRS; IRRIGATION.) Pop., 1895, 7786; 1900, 8448; 1910, 10,256.

**ARNSTADT,** ärn'stät. The capital of the German principality of Schwarzburg-Sondershausen, situated in a picturesque country on the banks of the Gera, 12 miles south of Erfurt (Map: German Empire, D 3). Among its noteworthy buildings are a castle, containing a picture gallery and valuable porcelain collection, the Rathaus, and the Liebfrauenkirche, with a richly decorated portal. Arnstadt possesses numerous schools and a municipal hospital. Formerly it was the chief emporium for the trade in fruit and timber between the fertile lowlands and the Thuringian Forest region, and is still an important market for grain and agricultural products. It is also a manufacturing town, the industries including weaving, shoe and glove making, brewing, the manufacture of pottery, etc. There are copper deposits in the neighborhood, and mines of rock salt. Warm brine baths have made Arnstadt an important watering place in summer. The composer, J. S. Bach, was for several years organist at the church of

St. Boniface. Pop., 1890, 12,800; 1910, 17,907. Arnstadt is one of the oldest of Thuringian cities, its existence being traceable as far back as A.D. 704.

**AR'NULF** (c.850–899). King of Germany and Roman Emperor. He was a natural son of the East Frankish King, Carloman, who was a great-grandson of Charles the Great. In 887 he led the revolt which forced Charles the Fat to abdicate and was elected King of the East Franks—i.e., of Germany. In 891, in the battle of Louvain, on the Dyle, he won a decisive victory over the Northmen who were invading his kingdom. He invaded Italy in 894, was crowned Emperor in 896, and died in 899.

**ARNULF,** SAINT (c.582–641). An ancestor of the Carlovingian emperors, who derived their name, Arnulfinger, from him. He was Bishop of Metz from about 612 to 627, when he resigned his position and retired to a hermitage in the Vosges Mountains. His body was afterward buried in the famous church bearing his name at Metz.

**ARNUS.** See ARNO.

**AROA,** ä-rō'ä. A town in the State of Falcon, Venezuela, on the Aroa River, 70 miles by rail from Tucacas (Map: Venezuela, D 1). It is famous for copper mines in the neighborhood.

**AROER,** ăr'ō-ẽr *or* ā-rō'ẽr. A city on the banks of the Arnon, mentioned in Deut. ii. 36 and iii. 12 as the southern limit of Reuben's territory. According to the Mesha inscription it belonged to Moab. In Num. xxi. 15, Arnon is said to fall where the city stands; this probably refers to Aroer. It is no doubt the modern 'Ara-îr, on the Wady Mojib, 11 miles from the Dead Sea, where there are ruins of the old city. Consult: Burckhardt, *Travels in Syria*, p. 372 (1822); Tristram, *Land of Moab*, pp. 129 ff. (2d ed., 1874); Musil, *Moab* (1906); Schmidt, *Messages of the Poets*, pp. 323 ff. (1911).

**AROKSZALLAS,** ŏr'ŏk-säl'äsh. A town of Hungary, about 44 miles northeast of Budapest (Map: Austria-Hungary, G 3). It contains a fine church and carries on a considerable trade in grain. Pop., 1890, 11,190; 1900, 12,067.

**AROLAS,** ä-rō'läs, JUAN DE (1805–49). A Spanish romantic poet. He was born at Barcelona, was a member of the Piarist Order, and was appointed an instructor in the school of the order at Valencia. His collected poems, which first appeared in three volumes in 1860, were published in 1890 as the forty-third volume of the *Biblioteca selecta* (Valencia, 1840 et seq.). For a study of this remarkable poet-friar and his works, consult Lomba y Pedraja, *El P. Arolas, su vida y versos* (1898).

**AROLSEN,** ä'rōl-sen. The capital of the German principality of Waldeck, on the Aar, about 22 miles west-northwest of Cassel (Map: German Empire, C 3). There are a gymnasium, a parish church, and a castle, the latter containing a valuable library, a picture gallery, a fine collection of engravings, antiquities, and weapons. Arolsen is the seat of a district court. The town is the birthplace of the sculptor Rauch and of the painters Wilhelm and Friedrich Kaulbach. Pop., 1895, 2768; 1905, 2811.

**ARO'MA** (Lat. Gk. *ἄρωμα, arōma*, spice, sweet herb). A term employed to designate a spicy or a pleasantly pungent odor. Thus we speak of the *aroma* of roast meat and of the aroma, or *aromatic* smell, of hyssop, mint, and other plants. Aromatic smells are very characteristic of some natural orders of plants, as Labiatæ (mint, etc.) and Compositæ (milfoil, etc.). They depend largely on the presence of volatile oils. See NOSE; SMELL; AROMATICS.

**AROMATARI,** ä-rō'mä-tä'rē, GIUSEPPE DEGLI (1586–1660). An Italian physician and naturalist, born at Assisi. He studied at Montpellier and Padua and practiced for many years at Venice. He became widely known and declined flattering invitations from the Duke of Mantua, Pope Urban VIII, and King James I of England. His "De Generatione Plantarum in Seminibus," a letter addressed to Nanti, and first published as part of the volume, *Disputatio de Rabie Contagiosa* (1625), was once very famous.

**AR'OMATICS** (Gk. *ἀρωματικός, arōmatikos*, aromatic). A class of medicines which owe their efficacy to oils obtained from them by distillation, and called volatile, distilled, or essential oils. They emit an agreeable, aromatic odor and usually have a warm, pungent, spicy taste. Aromatics include also certain other drugs and some animal substances. Among the families which yield the most important aromatics are the Labiatæ, Umbelliferæ, Lauraceæ, Myrtaceæ, Aurantiaceæ, Coniferæ, Scitaminæ, Orchidaceæ, etc. In some cases, the aromatic principle is diffused throughout all parts of the plant, but it is usually condensed in particular organs, such as the root, in ginger; or the bark, in cinnamon, canella, and cascarilla; or the flowers, as in cloves; or the fruit, as in anise and vanilla; or the wood, as in sandalwood and aloes-wood; or the leaves, as in the case of the Labiatæ, Umbelliferæ, etc.

Aromatics may be arranged in the following sub-classes: 1. Those in which the active principle is an essential oil, as the oil of thyme, lavender, cajeput, neroli, fennel, etc. 2. Those containing camphor, or an allied body, such as artificial camphor obtained from turpentine. 3. Bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood, etc. 4. Those of which musk is the type, such as civet and amber; and certain plants with a musklike odor, such as *Malva moschata, Mimulus moschatus*, and *Hibiscus abelmoschus*. 5. Those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and Tolu, which possess stimulant properties.

They are employed internally to disguise the taste of other drugs. Locally they are used as counter irritants, local anæsthetics, and antiseptics.

**ARONA,** ä-rō'nä. A town in north Italy, 42 miles northwest of Milan, near the southern end of Lake Maggiore. Steamers connect it in summer with Locarno in Switzerland. It has silk, cotton, and metal works and is commercially very active because of its transportation facilities. A noteworthy feature of the town is a metal statue, 70 feet high, erected in 1697 to the memory of Cardinal Carlo Borromeo, who was born here in 1538. Pop., 1881, 4182; 1901, 4700; 1911, 6271.

**ARONHOLD,** ä'ron-hōlt, SIEGFRIED HEINRICH (1819–84). One of the founders of the mathematical theory of invariants, to which he contributed in particular the symbolic notation afterward developed by Clebsch and Gordan. His name is also associated with the plane curves of the third and fourth orders. He was professor in the technical school at Berlin in 1863–83.

**ARO'NIA.** See CRATÆGUS.

**AROO ISLANDS.** See ARU ISLANDS.

**AROOSTOOK,** â-rōōs'tŭk. A river rising in Piscataquis Co., northern Maine, 1050 feet above the sea, flowing northeast through Aroostook County, and entering the St. John River, in New Brunswick (Map: Maine, H 2). It is the chief tributary of the St. John River, and along its valley lies some of the richest soil in the State. It is about 125 miles long, and drains an area of 2290 square miles, most of which is in Maine. It falls 705 feet from its source to the State line, a distance of 117 miles, thus affording extensive water power. It possesses historical interest from its connection with the long-agitated question of the northeastern boundary between British America and the United States.

**AROOSTOOK,** LADY OF THE. The title of a novel by W. D. Howells. The heroine of it takes passage across the Atlantic on a trading vessel, the *Aroostook*, no other woman being on board. The book is among the best of Howells's earlier period.

**AROUET,** â'rōō'â'. See VOLTAIRE.

**ARPACHSHAD,** är-pāk'shăd. In the list of eponyms of the nations in Gen. x., Arpachshad appears as the third son of Shem, ancestor of the Terahites and consequently of the Hebrews. The name is supposed by many scholars to represent Arrapachitis (q.v.). Recently discovered Babylonian inscriptions have added to the probability of this view by showing the great importance of the ancient Semitic kingdom of the Gutians, with its capital Arrapcha. That the first part of the word refers to Arrapachitis is now generally held. The ending *shad* is more difficult to explain. The absence of Babylonia in the list has caused some surprise. Josephus (*Ant.* i, 6, 4) declared that the Chaldæans were formerly called Arphaxadæans. Schlözer, Michaelis, and others gave up Arrapachitis to find Kesed-Chaldæa in the word; Cheyne secured both Arpach and Kesed by the insertion of a letter. Less plausible are the suggestions of Hommel that the word is composed of *Ur*, the Egyptian *pa*, and *Kesed*, and of Delitzsch that it was originally *Arba kishadi*, meaning 'the four sides.' Schmidt explains the word as made up of *Arpach* and *shadu*, 'mountain,' Arpachshadi meaning 'the Arrapcha of the mountain,' i.e., Kara Dagh. This theory can only be verified by a certain identification of the site.

**AR'PAD** (Assyrian *ar-pad-da*). An ancient city of Syria, the site of which is 13 miles northwest of Aleppo. It is mentioned in the time of Adadnirari IV (812–783 B.C.) and frequently afterward in the Assyrian inscriptions. In 740 B.C. it fell into the hands of Tiglath Pileser IV. Its importance may be judged from the fact that it becomes one of the eponym cities from whom *limmi*, or 'archonts,' are taken. It is mentioned in Isa. x. 9. The modern Tell Erfad represents its locality.

**ARPÁD** (?–907). The national hero of Hungary and a semi-mythical personage. He led the Magyars into Hungary, c.875, and by c.906 he had conquered much of the territory. He also made incursions into Italy about 900 and returned laden with booty. He died in 907. The first crowned King of the house of Arpád was St. Stephen, who became ruler in 997. The Arpád dynasty became extinct in the male line with Andrew III in 1301. Arpád lives in the popular songs of the country; his history, even in the oldest chronicles, is mixed up with the national legends.

**ARPEGGIO,** är-pĕd'jō (It. harping, from *arpa*, harp). In music, a chord of which the notes are sounded not simultaneously, but in succession, in a broken manner, as on a harp. In older music arpeggios are to be played twice: once beginning on the lowest note up to the highest, and then again down, ending on the lowest.

**AR'PENT,** *Fr. pron.* ar'paN'. The old French land measure, corresponding to our acre. The word is derived from *arepennis, arapennis*, the Latin form of the name of a Gallic land measure. It was identified by Columella with the Roman *actus*, or half *iugerum*. The measure varies with different localities. As used in lower Canada and Louisiana, it equals about five-sixths of an acre (.845) or a little over 34 ares (34.191).

**ARPINO,** är-pē'nō (anciently, Lat. *Arpinum*). A town in the province of Caserta, south Italy, 14 miles north of Roccasecca, and 94 miles northwest of Naples, near the river Garigliano (ancient Liris), situated high above the valley at an altitude of 1475 feet (Map: Italy, H 6). It was a very ancient town of the Volsci and was celebrated as the birthplace of Marius and Cicero. Extensive remains of Cyclopean masonry testify to the importance of the city in ancient days. The Romans wrested the town from the Samnites in 305 B.C.; in 188 B.C. its inhabitants became full citizens of Rome. By imperial times, however, it had lost its importance. Cicero often mentions it and lays his *De Legibus* there, on his ancestral estate, at the junction of the rivers Liris and Fibrenus. Near Arpino are a Trappist convent, called Casamari, and a bridge called Ponte di Cicerone. The public school bears the name Collegio Tulliano, and the local theatre is Teatro Tulliano. The local cloth manufacturers proudly proclaim that in the time of the Roman Republic Arpinum was famous for woolens, and that the father of the immortal orator was superintendent of a fulling mill. Arpino also manufactures parchment, paper, and leather, and quarries excellent marble. Pop., 1881, about 5000 (commune, 11,368); 1901 (commune), 10,607; 1911, 10,309. Consult Kelsall, *Classical Excursion to Arpino* (Geneva, 1820).

**ARPINUM.** See ARPINO.

**ARQUA,** är-kwä'. A village in north Italy 12 miles southwest of Padua. Here the last five years of Petrarch's life were passed (1569–74). His house has faded frescoes of scenes from his poems, and a few souvenirs, and his sarcophagus rests on red marble columns in front of the church. Pop., 1900, 1600.

**ARQUEBUS,** är'kwē-bŭs, or **HARQUEBUS,** (Fr. *arquebuse*, OF. *harquebuse*, from Dutch *haakbus*, from *haak*, hook + *bus*, gun barrel; cf. Eng. *hagbut*, and Ger. *Hakenbüchse*, a gun with a hook). A gun resembling the modern musket. Hand-guns are mentioned as early as 1414, but not until the second half of the fifteenth century do we find illustrations of them. The gun at this period consisted of a metal tube, fixed in a straight stock of wood, with a vent at the top of the barrel, where the match was applied. Some time between the close of the fifteenth century and the middle of the sixteenth the lock was added. Of locks there were two kinds: the first moved toward the gunner when the trigger was pressed; the second, like the modern lock, receded. It was not until toward the middle of the sixteenth century that firearms became important in war-

fare. The arquebus of the period is of two principal kinds, fired with a rest or without one. The arquebusiers were both footmen and cavalry, and in England many yeomen of the guard became arquebusiers. By the beginning of the seventeenth century the arquebus was being displaced by the musket.

**ARQUES-LA-BATAILLE**, ärk-lä-batīy. A French village in the department of Seine-Inférieure, which contains the remains of an old castle built by William the Conqueror's uncle. Here Henry IV defeated the Duke of Mayenne, 1589. Pop., 1911, 1598.

**ARRACACHA**, ăr'rà-kä'chà (Sp. from native name). A plant, *Arracacia xanthorrhiza*, of the family Umbelliferæ, a native of Jamaica and of the elevated tablelands in the neighborhood of the cities of Bogotá, Colombia, and Caracas, Venezuela, and of regions of similar climate in other parts of tropical South America. It is much cultivated in its native country for its roots, which are used as an esculent. The roots divide into a number of parts, which resemble cows' horns or large carrots. When boiled, they are firm and tender, with a flavor not so strong as that of a parsnip. The plant is much like hemlock and has a similar heavy smell. The flowers are in compound umbels and are of a dull purple color. The arracacha was at one time very strongly recommended as a substitute for potatoes. It was introduced into Great Britain by the Royal Horticultural Society, and its cultivation perseveringly attempted; but it was found unsuitable to the climate of England and of other parts of Europe, where it was tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavorable to it. It seems to require a very regular temperature and constant moisture. In deep loose soils it yields a great produce. It is generally propagated by offshoots from the crown of the root. By rasping and washing the root a starch similar to arrowroot is obtained. There are five or six other species of *Arracacia*, most of them Mexican.

**AR'RACK** (Ar. *'araq*, sweat, juice, spirituous liquor, from *'araga*, to sweat), RACK, or RAKI. A term applied to Oriental distilled liquors, especially to that distilled from fermented rice and the fermented sap (toddy) of the coconut (palmyra) and other palm trees. Other substances used in making arrack are combinations of rice and sugar, or rice and molasses, and berries, dates, figs, or grapes. It is usually a colorless liquid, but when stored in casks it takes on a slight yellowish or brownish tinge. It has an agreeable taste. It improves with age and the better varieties are not unwholesome. The best varieties are from Batavia, Java, where the materials used are as follows: Rice, 35 parts; molasses, 62 parts; toddy, 3 parts, the yield of pure arrack being 23½ parts. In Ceylon it is made entirely from palm-flower juice. The Indian arrack is made from the flowers of the Mahwa tree. Excellent qualities are made in Madras, China, and Siam. The intoxicating power of arrack is sometimes increased by the addition of hemp, poppy leaves, and the juice of stramonium. Arrack is now made commercially in Germany and Holland. *Saki* is the local name given to the Japanese variety of arrack. As an average analysis of arrack Blyth gives the following: Alcohol, 52.70, extract, 0.82, ash, 0.24, and water, 47.194 per cent. Besides the above constituents arrack contains various kinds of compound ethers (esters), aldehydes, etc., which give it its characteristic aroma and flavor.

**AR'RAGONITE.** Same as ARAGONITE.

**ARRAH**, ăr'ra. A town and railway station in the district of Shahabad in the presidency of Bengal, India, in lat. 25° 31′ N. and long. 84° 43′ E., 33 miles west of Patna (Map: India, D 3). It is situated in a fertile country and had a population, 1901, of 46,170. The various incidents in its history, the chief of which are connected with the Mutiny of 1857, constitute its chief claim to notice. The most thrilling was the siege sustained until deliverance after eight days by 12 Englishmen and 50 faithful Sikhs against a force of 2000 Sepoys.

**ARRAH NA POGUE**, ăr'rà nä pōg. A play by Dion Boucicault, and, next to *The Shaughraun* and *London Assurance*, probably his best; first played in 1865.

**ARRAIGN'MENT** (from OF. *aranier, araisnier*, Fr. *arraisonner*, Low Lat. *arrationare*, to call to court, from Lat. *ad*, to + *ratio*, reason, account). The bringing of a person who has been formally accused of crime before the court which is appointed to try him. The arraignment thus follows the indictment and may be regarded as the first stage in the trial of the accused. A prisoner is entitled to a speedy arraignment and may, in case of unnecessary delay, move to have the indictment dismissed. Its characteristic features are: 1. Calling the prisoner to the bar of the court by his name. 2. Reading the indictment to him, or furnishing him with a copy. 3. Asking him whether he pleads guilty or not guilty thereto. If the indictment is for a felony, the personal presence of the criminal is necessary to a valid arraignment at common law (changed in some States by statute); but in case of a misdemeanor he may appear by counsel. Having been arraigned, the accused may obtain from the court time in which to answer the indictment, or he may move to set aside the indictment, or he may demur or plead thereto. See DEMURRER; TRIAL; PLEADING, and the works there referred to.

**ARRAIGNMENT OF PARIS, THE.** A piece by George Peele, half pageant, half masque, played, in 1581, by the chapel children before Queen Elizabeth, who is impersonated in it as Diana. The plot, so far as there is one, is based on the legendary trial of Paris by Diana for error in judgment in giving the apple to Venus. A personage called Colin in this play is thought to stand for Spenser and to have caused the subsequent writing of that poet's *Colin Clout's Come Home Again*, as a retort to Peele, who there figures, perhaps, as Palin.

**ARRAN**, ăr'an. An island in the Firth of Clyde, and county of Bute, Scotland, 5 miles southwest of Bute, separated from Kintyre by the Kilbrennan Sound (Map: Scotland, C 4). It is of oblong shape, 20 miles long, from 10 to 11 miles wide, with an area of 165 square miles. The surface is mountainous, in the north reaching an altitude of 2866 feet above the sea, and is traversed by small streams and lochs. Arran is remarkable geologically, and intrusive igneous rocks give the northern half of the island wild and beautiful scenery. It has quarries of limestone, coal mines, and some of the mountains contain jasper, agates, and rock-crystal. Only a small part of the area is under cultivation, the most important industries being cattle raising

and herring fishery. There are two harbors on the east side, Brodick and Lamlash, the latter sheltered by Holy Island. Off the southern coast lies the small island of Pladda, with a lighthouse. Numerous prehistoric and Danish relics exist, and the names of some of the caves bear evidence of Robert Bruce's sojourn. The greater part of Arran belongs to the Duke of Hamilton, whose seat is Brodick Castle. The population of the island was 5234 in 1871, 4824 in 1891, and 4819 in 1901. About half the people speak both English and Gaelic. Consult *The Book of Arran*, edited by J. A. Balfour (Glasgow, 1910).

**ARRANGING** (Fr. *arranger*, to put into rank, order, from *à*, Lat. *ad*, to + *rang*, rank, order). In music the working over of a composition for performance by musical agencies other than those originally designated by the composer. Thus, orchestral works, as, e.g., symphonies or overtures, are arranged for the piano, or compositions written for the piano for four hands are arranged for one piano; vocal compositions, as, e.g., operas or songs, may be arranged for some instrument, usually for the piano. When the arrangement is not a mere mechanical transcription of the notes written by the composer, but implies some creative work of the arranger, inspired by the original music, then it bears various names, as, e.g., *pot-pourri*, *fantasia*, *paraphrase*, or *transcription*. Liszt was one of the most famous of arrangers.

**ARRAPACHITIS,** ăr'ă-pă-kī'tĭs (Gk. 'Αρραπαχῖτις). A country located by Ptolemy (vi, 1, 2) between Armenia and Adiabene, consequently on the upper Zab, while the Babylonian and Assyrian inscriptions seem to indicate a location farther south between the lower Zab and the Diyala, the Tigris and some point in the Sulaimania Mountains. It was manifestly in the latter region that Arrapcha, the capital of the Gutian kingdom, was situated, though it has not yet been identified with any modern site. Probably the name "Arrapachitis" attached itself to the northern district, which, after the conquest of the Lulubians, belonged to the territory of Gutium. This district was called in Old Armenian Albach, and is still designated by the Kurds as Albak. The city of Arrapcha is mentioned in the time of Hammurabi (2124–2081 B.C.). It was apparently taken by Assurnazirpal III (885–860), since it is one of the Assyrian cities rebelling against Shalmanezer III (860–825). Its importance may be judged from the fact that during the next century its governors often appear as *limmi*, or archonts, for the year. After the fall of Nineveh, in 606, Arrapcha fell to the lot of the Chaldæan kingdom, and Nebuchadnezzar gave orders to the people of the city. As late as in the time of Cyrus the territory of Arrapachitis was also known as the land of the Gutians. It was from there that the Gutians, probably under the leadership of their mighty King Erridu-pizir, fell upon Babylonia and overthrew the second dynasty of Uruk in the thirty-fifth century, if we follow Nabunaid's chronology. (See BABYLONIA.) The Gutian kings wrote their inscriptions in a Semitic dialect, and it is not improbable that the Gutians, like the Lulubians and the Assyrians, were akin to the Akkadians. This seems to be suggested also by Gen. x. 22, where Arpachshad (q.v.) is represented as a son of Shem. The land of Arpaha is also mentioned as a separate country with Assyria by the Egyptians in the fifteenth century B.C. (Lepsius, *Denkmäler*, 89 g.). Consult: Delitzsch, *Wo lag das Paradies?* pp. 124 f. (Leipzig, 1881); W. Max Müller, *Asien und Europa*, p. 279 (1893); Scheil, in *Comptes rendus de l'Académie des Inscriptions*, pp. 318 ff. (1911).

**ARRAS,** ă'rŭs' (from *Atrebates*, Lat. name of a Gallic tribe). Formerly a fortified town, now capital of the department of Pas-de-Calais, in France, about 35 miles north-northeast of Amiens (Map: France, N., H 2). It was at one time the capital of the county of Artois. It is situated on the banks of the Scarpe, partly on an eminence and partly on a plain, and consists of four divisions—the city, upper town, lower town, and citadel. It is a principal station on the French Northern Railway, distant from Paris by this route 134 miles and from Brussels 97 miles. The houses are of hewn stone, and in the lower town they are handsomely built and uniform; the streets are straight and wide, set off with several fine squares and many beautiful public buildings. Among the principal edifices are the cathedral of Notre Dame, built in a composite Italian style, between 1755 and 1833; the residence of the prefect, the town hall, the theatre, a girls' school in the Chapelle des Ursulines, and the public library. The fortifications of Arras were the first to be constructed by the celebrated Vauban, according to his own system. It has been the seat of a bishop since 390 A.D., and two ecclesiastical councils have been held here—one in 1025, the other in 1490. The grain market of Arras is the most important in the north of France. Its principal manufactures include beet sugar, agricultural implements, hosiery, petroleum products, and leather. It has considerable trade in grain and flour, and there is commerce in oil, wine, brandy, and the industrial products of the city. It appears from the writings of Jerome that Arras was remarkable for its woolen manufactures in his time; afterward, during the Middle Ages, it was famed for its tapestry; indeed, the name of the town was transferred to this article of manufacture, and *arras* was the name given in England to any richly figured hangings. Pop., 1901, 25,813; 1906, 24,921; 1911, 26,080. The ancient name of Arras was Nimetacum, and the town was the capital of the tribe of the Atrebates. With Artois it was ceded by the States of the Netherlands to Louis XI of France in 1482; but, the inhabitants having revolted, the King laid siege to the town, stormed it, and slew or expelled the people, whom he replaced by others brought from all parts of his dominions, ordering the city to be thenceforward called *Franchise*, to obliterate the very name of Arras. Soon afterward (1493) it was ceded to Maximilian of Austria, and was retained by the Spanish branch of the house of Hapsburg till 1640, when Louis XIII of France took it after a long siege. By the Treaty of the Pyrenees it was finally ceded to France. Arras suffered much in the time of the first French Revolution, especially in the year 1793. Robespierre and his brother were natives of the town.

**AR'RAS.** A name for large tapestries used as wall hangings. They appear to have been first made in large numbers at Arras, at that time a city of Flanders, but now in France; hence their name, which in Italian is *arazzi*. The name was preserved even after Arras ceased to be the great centre of their manufacture, in the fifteenth century. Among the most famous

single series is that for which Raphael made designs.

**ARRATE Y ACOSTA,** ăr-rä'tā ē ä-kōs'tä, JOSÉ MARTÍN FÉLIX (1697–1766). A Cuban historian. He was born at Havana, studied law in Mexico and Havana, and was appointed alcalde of Havana in 1752. He wrote *La Habana Descripta* and a history of Cuba, under the title *Llave del Nuevo Mundo y antemural de las Indias Occidentales*, which was not published until 1830. A new edition appeared in 1876.

**ARRAWAK,** ăr'rä-wäk. See ARAWAK.

**ARREBO,** ăr're-bō', ANDERS CHRISTENSEN (1587–1637). A Danish poet, born at Aroöskjöbing. He was appointed Bishop of Drontheim and was one of the promoters of the Renaissance poetry. He wrote some secular verse, but is best known for his *Hexaëmeron*, a description of the six days of the Creation, and a metrical translation of the Psalms of David. For his life, consult the biography by Rördam (Copenhagen, 1857).

**ARREST'** (Low Lat. *arrestare*, from Lat. *ad*, to + *restare*, to stop behind). The taking of a person into custody in order to compel his attendance before a court of justice or to enforce the discharge of a legal obligation. In primitive law the arrest and detention of a debtor either to enforce payment of his debt or to subject him to the mercy of his creditor as a satisfaction thereof is a common procedure, but it is seldom employed in civilized communities to-day except as an incident of criminal proceedings. 1. *Civil arrest.*—By a fiction of the common law of England a person who did not pay a judgment against him was deemed guilty of a breach of the peace, "subjecting his body to imprisonment," says Blackstone, "by the writ of *capias ad respondendum.*" The judges who established this fiction had no bowels of compassion for the insolvent debtor. Said Justice Hyde, in 1663: "If a man is taken in execution and lies in prison for debt, neither the plaintiff, at whose suit he is arrested, nor the sheriff who took him is bound to find him meat, drink, or clothes. He must live on his own, or on the charity of others, and if no man will relieve him, let him die in the name of God, says the law, and so say I." This inhuman policy worked badly; and a few years after Justice Hyde's declaration Parliament felt compelled to enter upon a course of mitigating legislation, which terminated during the last century in the abolition of imprisonment for debt, both in Britain and in this country. In some civil actions a party is still subject to arrest, either during its progress or upon its termination. As a rule these actions are of a quasi-criminal nature, e.g., to recover a fine or a penalty; or they are brought to redress wrongs to person or property. Ordinarily, a warrant of arrest in a civil suit will not justify the officer in breaking into a house to take the party; nor can it be lawfully executed on Sunday; nor are certain privileged persons, such as foreign representatives, members of Congress and Legislature in attendance upon their duties, and others liable to arrest in civil proceedings. 2. *Criminal arrest.*—Not only public officers, but private persons as well, may arrest an actual or suspected criminal. For a misdemeanor committed in his presence, or for a felony committed, although not in his presence, either a peace officer or a private person may arrest the offender without a warrant (q.v.), and a peace officer is authorized to arrest without a warrant, on reasonable suspicion that the arrested party has committed a felony. This subject is regulated by statute in each jurisdiction, as is the mode of obtaining a warrant. A criminal arrest may be made on any day; a peace officer may break into a building to execute a criminal warrant, as well as call upon any person to assist him; and, as a rule, only foreign representatives, with their families, are privileged from criminal arrest. The liberty of the individual against unlawful interference with his freedom, whether exercised under the forms of law or otherwise, by an officer of the peace or a private citizen, is guarded by the action for false imprisonment (q.v.). Consult: Hawley, *Law of Arrest on Criminal Charges* (2d ed., Chicago, 1891); Freeman, *A Treatise on the Law of Executions in Civil Cases* (3d ed., San Francisco, 1900); and the works mentioned under the articles referred to above.

**ARREST,** ăr-rĕst', HEINRICH D'. See D'ARREST.

**ARREST' OF JUDG'MENT.** In the practice of the English common-law courts, an expedient on the part of an unsuccessful defendant, after verdict rendered against him, to have the judgment stayed or arrested, on the ground that there was some error which vitiated the proceedings. If the objection succeeded, it was fatal to the prosecution of the plaintiff's cause of action, there being no opportunity for amendment after trial. The severity of this rule has been somewhat modified by legislation, so that, under modern applications of the remedy, the action or prosecution may in a proper case be renewed. At the present day, in the United States as well as in England, a defendant may have the judgment against him arrested only for good and sufficient reason appearing on the record of the case, as where the pleadings are not a sufficient basis for the action, or if there be a fatal variance between the pleadings or indictment and the proof upon which the verdict was rendered. But the existence of facts not in the record, as the discovery of new evidence, or a verdict reached by the jury against the weight of evidence, will not justify an arrest of judgment. In the former case the court must proceed to judgment, notwithstanding the new facts alleged to exist, and in the latter case the court can only set aside the verdict and order a retrial of the case. This is a very different result from that which attends an arrest of judgment, the effect of which is to set aside all proceedings in the case and dismiss the complaint or indictment. This relief is usually obtained upon the defendant's motion, made after verdict and before judgment, but the court has the power to grant it even if it be not demanded. Judgment once rendered is conclusive and cannot be arrested. It may, however, under proper circumstances—as where taken by the excusable default of the defendant—be reopened by the court in which it was obtained, or its execution may, for good cause, be stayed on application to a higher court. See JUDGMENT; STAY; and the works there referred to.

**ARRETIUM,** ăr-rē'shĭ-ŭm. An ancient Etruscan city, the modern Arezzo (q.v.).

**AR'RHENAL.** Soda methylarsenate. An arsenic derivative, intended to replace that drug, as a tonic and antiperiodic, especially in chronic malaria. Chemically it is disodic-methyl arsenate. See ARSENIC; CACODYL.

**AR'RHENATHE'RUM** (Gk. ἄρρην, *arrhēn*, male + ἀθήρ, *athēr*, the beard or spike of an ear

of corn). A genus of grasses embracing three species allied to Holcus (see SOFT GRASS) and Avena (see OAT GRASS). The species are tall perennial grasses, with flat leaf-blades and erect panicles, which are often one-sided. *Arrhenatherum elatior*, known also as *A. avenaceum*, *Avena elatior*, or *Holcus avenaceus*, is a common grass in Great Britain. It is sometimes called oat grass, from the resemblance to the coarser kinds of oats in the general appearance of the panicle. In France it is very much cultivated for fodder, and it is often called French rye grass. It has, however, no affinity to the true rye grass, *Lolium*. In the United States east of the Mississippi River this grass is grown to some extent as a hay grass. It does not form a good sward and consequently is not valuable for pastures except when mixed with other species. It is here known as tall meadow oat grass.

**ARRHENIUS**, ăr-rā'nĭ-us, SVANTE (1859—). A Swedish physical chemist. He was born near Upsala and studied physical science at the university of that city. After a brief period of teaching at his *alma mater* he spent several years abroad, carrying on original investigations in collaboration with some of the best European chemists and physicists of the day, and in 1891 was made professor in the University of Stockholm. Arrhenius' researches have resulted in one of the most important among the recent contributions to science. Confining his attention almost entirely to the relations between electrolytic phenomena and the chemical and physical properties of substances, he succeeded in establishing on a firm basis a general theory, which is now universally accepted by the scientific world, viz., the so-called theory of electrolytic dissociation. According to this theory, a substance whose aqueous solution is capable of conducting electricity is broken up in solution into parts charged, some with positive, others with negative electricity. Thus, ordinary brine contains, according to Arrhenius' theory, electro-positive "ions" of the metal sodium, and, separated from them, electro-negative ions of chlorine. The theory reminds one of the old dualistic view of the nature of chemical composition, advanced by Davy and Berzelius in the first part of the nineteenth century; and, in the opinion of many authorities, may lead to a revival of those views in some modified form. What is certain is that the theory of electrolytic dissociation furnishes an excellent explanation of a host of chemical phenomena which would otherwise remain entirely unintelligible, and that it correlates a number of different facts, between which no connection could otherwise be detected. Arrhenius' publications include *Sur la conductibilité galvanique des électrolytes* (1884), a work (in German) on electro-chemistry (1902), the *Lehrbuch der Kosmischen Physik* (1903), and a number of original monographs. In 1907 he published a series of lectures delivered at the University of California under the title of *Immuno-Chemistry: Applications of Methods of Physical Chemistry to the Theory of Toxins and Antitoxins*. In his *Worlds in the Making* (1908), he combats the theory that the universe is tending to destruction by loss of heat and motion. In 1903 he received a Nobel prize for achievements in the field of chemistry. For a fuller description of Arrhenius' theory and its value to the scientific world, see DISSOCIATION.

**AR'RHIDÆ'US** (Gk. *'Αρρίδαιος, Arrhidaios*). An illegitimate son of Philip of Macedon by Philinna, a dancing girl of Larissa. He was at Babylon when Alexander died, in 323 B.C., and, though almost an imbecile, was elected King of Macedonia, under the name of Philip, with the understanding that, if a son were born to Roxana, the widow of Alexander, he should be associated with Arrhidæus in the government. The next year Arrhidæus married Adea, called Eurydice, the granddaughter of Perdiccas II. Two years later he and his wife were captured by Polysperchon, the leader of the cause of Alexander's son, born of Roxana, and both were put to death by the order of Olympias, the grandmother of the young King.

**AR'RIA.** The wife of the Roman Cæcina Pætus, who, for treason to the Emperor Claudius, was ordered to end his own life by suicide (in 42 A.D.). When Pætus hesitated, she seized the dagger, drove it to the hilt into her own breast, and then handed it to him, saying calmly, "Pætus, it does not pain me!" (*Non dolet, Pæte!*) She fell dead, and the husband at once dispatched himself with the same weapon. (See Pliny the Younger, *Epistles*, iii, 16; Martial, i, 13.) Arria was mother of the Arria who was married to P. Clodius Thrasea Pætus.

**ARRIAGA**, ăr'rē-ä'gà, MANOEL DE (1842–1917). First President of the Republic of Portugal. He was born at Horta, in the Azores, and was educated at the University of Coimbra. He studied law and became one of the most distinguished practitioners in Lisbon. During the reign of Louis I (1861–89) he was for many years a deputy from the Republican party to the Chamber of Representatives. In that body he became known as a fluent speaker who was strongly identified with Republican ideals and movements and a bitter enemy of monarchic institutions. In order to hush his vehement assaults upon the monarchy, King Louis offered him the position of tutor to his sons, but this he refused. He took an active part in the establishment of the republic in 1911, and on August 24 of that year was elected its first President under the new constitution. He was the candidate of a coalition of the Conservative Republicans, who were opposed by the radicals under the leadership of Dr. Alfonso Costa, the Provisional Minister of Justice. In May, 1915, Dr. Arriaga was succeeded as President by Theophilo Braga (q.v.). (See PORTUGAL, *History*.) Well known as a writer and scholar, Arriaga was given the degree of Doctor of Laws by the University of Coimbra.

**ARRIAGA**, ăr'rē-ä'gà, PABLO JOSÉ D' (1562–1622). A Spanish Jesuit and author. He was born at Vergara, was rector of the Jesuit college at Arequipa, and subsequently the first rector of that at Lima. He perished in a shipwreck in 1622. Among the many historical works that he left, the most important are *Directorio espiritual, Extirpacion de la idolatría de los indios del Perú*, and *Ejercicios espirituales*.

**AR'RIA'NUS** (Gk. *'Αρριανός, Arrianos*) (?–c.180 A.D.). A distinguished historian and a native of Nicomedia, in Bithynia. He was born near the end of the first century A.D. of good family, and upon obtaining the Roman citizenship assumed the name Flavius. After completing his education he left home and lived for some time, in the reign of Trajan, at Nicopolis, where he was a devoted pupil of the Stoic philosopher Epictetus. He won early in life the friendship of Hadrian and was from time to time honored with marks of the Emperor's

favor. While in the public service he traveled much and became acquainted with a number of lands and peoples. In 130 A.D. he was *consul suffectus* and soon after was made *legatus Augusti pro prætore* of the province of Cappadocia, an office which he held for several years, successfully defending the province against an invasion of the Alani. Under Antoninus Pius he obtained the consulship. In 147–148 A.D. he appears at Athens, where he had obtained the citizenship, as Archon Eponymos. He was also at some period of his life priest of Demeter (Ceres) in his native town. During the latter half of his life he seems to have kept himself apart from public service and to have devoted himself to letters.

As a writer Arrianus was a close imitator, both in subject and in style, of Xenophon. His relation to Epictetus was, in his own regard, that of Xenophon to Socrates, and he was known at Athens as the "younger Xenophon." He wrote on philosophical, historical, and military subjects. His philosophical writings all related to Epictetus. *The Discourses of Epictetus* (Διατριβαὶ Ἐπικτήτου), in eight books, the first four of which have been preserved, comprised notes taken by Arrianus of his master's lectures and put in form for publication. So far as possible, the original words of the master were preserved. *A Manual of Ethics* (Ἐγχειρίδιον Ἐπικτήτου), together with the commentary of Simplicius on the same, has also come down to us. *The Conversations of Epictetus* (Ὁμιλίαι Ἐπικτήτου), in 12 books, is mentioned, though this work was possibly another form of the *Discourses*. The most important historical work of Arrianus is *The Anabasis of Alexander the Great*, in seven books, which, both in the number of its books and in its style, is a reminiscence of Xenophon. The *Anabasis* not only contains the campaigns of Alexander in Asia, but is a complete narrative of the life of the King from the beginning of his reign to the time of his death. It is an impartial and accurate narrative, based on the most trustworthy authorities and written in a plain and unadorned style. The two chief authorities used were Ptolemy, son of Lagus, and Aristobulus, both officers in Alexander's army. Besides these, the works of Eratosthenes, Megasthenes, Nearchus, and others, as well as the letters of Alexander, etc., were drawn upon. *The Indica* (Ἰνδική) is a geographical work, containing a description of India, together with an account of the voyage of Nearchus from the Indus to the Euphrates, and is written in the Ionic dialect. The sources were principally Nearchus, Eratosthenes, and Megasthenes. It was appended to the *Anabasis*, of which it may be regarded as a continuation. *The Events after Alexander*, in 10 books; *The Bithyniaca*, in eight books (containing a history of Bithynia from mythical times to the abdication of the last King, Nicomedes III, in 75 B.C., and *The Parthica*, in 17 books (containing an account of the Parthian War under Trajan), have been lost. Of *The Alanica*, a history of the Alani, only a small extract, called Ἔκταξις κατ' Ἀλανῶν, is preserved. *The Periplus of the Euxine Sea* is a description of a voyage around the Euxine Sea, undertaken by Arrianus in his official capacity as Governor of Cappadocia. It was a report made to the Emperor Hadrian, and dates from 130–131 A.D. A second *Periplus of the Euxine Sea* and a *Periplus of the Red Sea*, to which the name of Arrianus is attached, are later compositions. A work on tactics, preserved, was based on a work of the same name by Ælian, which, again, was taken in its main features from Asclepiodotus's work. The *Cynegeticus* is a short treatise on hunting, written as a supplement to Xenophon's work on the same subject. Other works, not preserved, were biographies of Timoleon of Corinth and Dion of Syracuse, and a *Life of Tilliborus*, a famous robber of Asia Minor. Editions of the *Anabasis* are by Krüger (Berlin, 1848), Sintenis (Berlin, 1867), and Abicht (Leipzig, 1876). There is a translation by Chinnock (New York, 1893). The philosophical works are to be found in Schweighaüser's *Epictetæ Philosophiæ Monumenta* (3 vols., Leipzig, 1799). They have been translated by Elizabeth Carter (London, 1758) and by Thomas Wentworth Higginson (Boston, 1891). The best critical edition of Arrianus is that of Dübner and Müller (Paris, 1846).

**ARRIAZA Y SUPERVIELA,** ăr'rē-ä'thä ē sōō'pĕr-vyā'lä, JUAN BAUTISTA (1770–1837). A Spanish patriotic poet, born in Madrid. After serving for several years in the navy, he abandoned it for a diplomatic career and became Secretary of the Legation, first in London and afterward in Paris. Later he was transferred to an important post in the Department of State. He returned to Spain in 1807 and did important service for his country during the French occupation by kindling the national spirit with his stirring *Poesías patrióticas*, issued in 1810. Subsequently, having declared himself an unconditional supporter of absolute monarchy, he received an important appointment in Ferdinand VII's cabinet, in the Department of Foreign Affairs. His earliest poems, *Las primicias*, appeared in 1793; *Emilia*, a didactic poem on the influence of the fine arts, in 1803. Though a master of form, Arriaza lacked real depth of feeling, and his poems owed their temporary vogue to their adaptability as popular songs, his ode entitled *Profecía del Pyreneo* rivaling even the *Marseillaise* in power and grandeur. A complete collection of his verse is to be found in the *Biblioteca de autores españoles*, vol. lxvii, and a selection in Wolf's *Floresta de rimas modernas castellanas* (Paris, 1837).

**ARRIERE** (ä'ryăr') **BAN.** See BAN.

**AR'RINGTON,** LILLIE. See BURROUGHS, MARIE.

**ARRIOLA,** ăr'rē-ō'lä, PEPITO (1896—). A pianist, and one of the most remarkable cases of precocious genius. He was born in La Coruña, Spain, Dec. 14, 1896. When only four years of age, the boy showed such unmistakable musical talent that he received regular instruction. His parents removed to Berlin, where he was placed under Alberto Jonás. In 1901, when only five years old, he began a tour of Germany, and in the following year he also visited England. Everywhere his astounding performance called forth unqualified praise. He came to America in 1909, where he was generally spoken of as "the second Mozart." From 1902 to 1904 he studied with Nikisch in Leipzig.

**ARRIVABENE,** ăr-rē'vä-bĕn'ä, GIOVANNI, COUNT (1787–1881). An Italian political economist, born in Mantua. He was arrested in 1820 as a revolutionary agitator, and was imprisoned for several months, but finally made his escape and took refuge in England. His political views had given the Austrian government such deep offense, however, that in 1824 he was sentenced to death *in contumaciam*, and his property was

appropriated by the State. While he was in London he devoted himself mainly to the study of political economy and published the work which first drew international attention to him, *Di varie società e istituzioni di beneficenza in Londra* (1828–32). He lived in Belgium from 1827 to 1859 and was one of the organizers and President of the Congress of Political Economy, held in Brussels in 1847. He was active in the founding of the Belgium Economic Society and subsequently became its President. In 1860 he returned to Italy, was appointed Senator, and became President of the Economic Society of Florence. He did much to improve economic conditions in Italy. Autobiographical are his *Intorno ad un' epoca della mia vita, 1820–22;* (1860; Ger. trans., 1861), and *Memorie della mia vita, 1795–1859* (2 vols., 1879). Arrivabene prepared also a translation in Italian of John Stuart Mill's *Principles of Political Economy* and of the more important writings of N. W. Senior. Under the title *Scritti morali ed economici*, his writings were collected in 1870.

**ARRO'BA** (Sp. and Portug. from Ar. *arrub*, a quarter, from *al*, the + *rub*, fourth part). A weight commonly used in Spain, Portugal, Brazil, and in the principal Spanish and Portuguese colonies, which varies with the locality. In Spain it is equivalent to the English quarter of a hundredweight, or 28 pounds. It is nearly the same in Portugal. In Spain, the arroba is also a measure of capacity, used for wine, brandy, etc., and contains four of our quarts.

**ARROM**, är-rōm', CECILIA DE. See CABALLERO, FERNAN.

**ARRONDISSEMENT.** See FRANCE, *Gov't.*

**ARROW.** See ARCHERY.

**ARROW**, THE. A small northern constellation, between Aquila and the bill of the Swan.

**AR'ROWHEAD'.** An aquatic plant of the genus *Sagittaria*, to which the name is sometimes applied. See AQUATIC PLANTS.

**AR'ROW-HEAD'ED CHAR'ACTERS.** See CUNEIFORM INSCRIPTIONS.

**AR'ROWPOINT'**, CATHERINE. A character in George Eliot's *Daniel Deronda*, a clever and very sensible young woman.

**AR'ROWROOT'.** A variety of starch extracted from the roots of certain plants growing in tropical countries. It is a fine, starchy farina, valued as a delicacy for use in preparing puddings, desserts, etc., and as a food for children and invalids easy to assimilate without digestive disturbance. It is obtained from the tuberous roots, or, more correctly, the rootstocks (rhizomes), of different species of the genus *Maranta*, belonging to the family Marantaceæ, and is characterized by solitary ovules, a fleshy style curved downward, branching stems, and white flowers. The species chiefly yielding it is *Maranta arundinacea*, a native of tropical America, cultivated in the West Indies and Florida, and growing about 2 feet high, with ovato-lanceolate, somewhat hairy leaves, clusters of small flowers on two-flowered stalks, and globular fruit about the size of currants. The roots (or rhizomes) contain a large proportion of starch. They are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with rather large paper-like scales. They are dug when a year old, washed, and carefully peeled. By rasping or otherwise the roots are reduced to a pulp and the starch removed by washing with water. Great care should be taken to prevent the starch souring and to insure cleanliness. The careful peeling of the roots is of great importance, as the skin contains a resinous matter, which imparts a disagreeable flavor to arrowroot, if allowed to mix with it. The West Indian arrowroot most esteemed in the market is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian arrowroot is not, in general, so highly valued, perhaps because substitutes for the genuine arrowroot more frequently receive that name. The *Maranta arundinacea* is now, however, cultivated both in the East Indies and in Africa. *Maranta indica*, which was supposed to be distinct from *Maranta arundinacea*, is now regarded as a mere variety of it, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica. Arrowroot is obtained also from *Calathea allouia* and *Clinogyne dichotoma*, plants closely related to *Maranta*.

The amount of starch present in the roots of the *Maranta* varies according to age, and runs from 8 per cent, in those of the young plant, to 26 per cent when full grown, at the age of 10 to 12 months. In Bermuda it is estimated that four barrels of peeled and cleaned rhizomes will yield in a good season 100 pounds of good arrowroot.

The prepared starch contains some 16 per cent water, 82 per cent nitrogen-free extract (mostly starch), 0.8 per cent protein, and very small amounts of fat and ash.

Arrowroot is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise. Through the microscope the particles are seen to be convex, elliptical or triangular. The dry starch is inodorous, but when dissolved in boiling water has a characteristic smell and swells up into a perfect jelly. Arrowroot is sometimes adulterated with rice starch, potato starch, sago starch, and with the common starch of wheat flour.

Large quantities of arrowroot are annually imported into the United States and Europe. As an article of diet, it is often prepared for invalids and children by merely dissolving it in boiling water and flavoring with sugar, lemon-juice, wine, etc. It is also often prepared with milk, made into puddings, etc. In the United States corn (maize) starch is very commonly used in general cookery for making puddings, etc., and arrowroot seems less common than was once the case.

A starch somewhat similar to arrowroot and partly known by the distinct name of *tous-les-mois*, is obtained from some species of the allied genus *Canna*. East Indian arrowroot is in part obtained from the tubers of *Curcuma augustifolia*. Other species of *Curcuma* (see TURMERIC), as *Curcuma zedoaria*, *Curcuma leucorrhiza*, and *Curcuma rubescens*, also yield a similar starch; the same tubers which, when young, yield a beautiful and pure starch, yielding turmeric when old. In Travancore this starch is the principal part of the food of the inhabitants. The young tubers of the galangal, *Altinia galanga*, another plant of the same family (Scitamineæ), are another source of this starch. A starch somewhat resembling arrowroot, and often sold under that name, is obtained from different species of the family Cycadaceæ, as from the dwarf, fleshy trunks of *Zamia tenuis*, *Zamia furfuracea*, and *Zamia pumila* in the West Indies, and from the large seeds of *Dion edule*, in the lowlands of Mexico. The Chinese prepare a similar starch from the

tubers of species of *Sagittaria*. The starch of the cassava, manihot, or manioc (see CASSAVA) is sometimes marketed under the name of Brazilian arrowroot. In England the name "Farina" or "English arrowroot" is applied to starch prepared from maize or from potatoes. Starch obtained from the roots of the *Arum maculatum* (see ARUM) is known as Portland arrowroot. Otaheite arrowroot is the starch of *Tacca pinnatifida*. All these as well as cornstarch are so nearly allied to true arrowroot as not to be certainly distinguishable by chemical tests; but the forms of the granules differ, so that they can be distinguished by the microscope. When of good quality and known purity, these starches are all wholesome, useful food-stuffs of practically the same nutritive value.

The name arrowroot is commonly said to have had its origin from the use of the fresh roots by the South American Indians as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been recommended as an antidote to poisons and a cure for the stings and bites of venomous insects and reptiles. But it is not improbable that the name is really another form of *ara*, an Indian word.

**AR'ROWSMITH,** AARON (1750–1823). An English cartographer, born at Winston, in Durham. He went to London at the age of 20. His publications include numerous topographic and hydrographic maps and charts, executed with the greatest care. His map of Scotland appeared in 1807, his *General Atlas* in 1817. His work on the *Geometrical Projection of Maps* was published posthumously (London, 1825). His son Aaron and his nephew John also published a number of cartographic works, and John (1790–1873) was one of the founders of the Royal Geographical Society.

**ARROW WOOD.** See VIBURNUM and Plate of TANSY, ETC.

**ARRO'YO,** ăr-rō'yō. A town in the department of Guayama, Porto Rico. It has a good harbor on the south coast of the island and is about 40 miles south by east of San Juan (Map: Porto Rico, E 4). The town is prettily situated, and, although somewhat isolated, has highway connection with important points. It is in a fertile region which produces much sugar, which, with rum and molasses, is widely exported. Some iron is mined in the district. The three caves of Aguas Buenas are here and are the principal noteworthy feature. A hurricane in 1899 wrought great havoc. Pop., 1899, 2137; 1910, 3220.

**ARROYO MOLINOS,** ăr-rō'yō mō-lē'nōs (Sp. Mill Creek). A village in Estremadura, Spain. It is noted as the scene of the complete defeat of General Girard, one of Marshal Soult's lieutenants, by Lord Hill, Oct. 28, 1811. General Girard had been sent out by Soult on a plundering foray with 5000 men, when he was surprised early in the morning by Hill, who had camped a league off at Alcuescar. The French colors, artillery, and 1300 prisoners were captured.

**ARRU,** ar-rōō', **ISLANDS.** See ARU ISLANDS.

**ARSACES,** ăr'sā-sēz. See ARSACIDÆ.

**ARSACIDÆ,** ăr-săs'ĭ-dē, or **AR'SACIDS.** The name of the royal dynasty which ruled over the Parthian monarchy from its foundation in the middle of the third century B.C. until its destruction by the Persian Sassanidæ in 226 A.D. A branch of the dynasty was established on the throne of Armenia about 150 B.C., and outlived the Parthian Arsacidæ. The accounts concerning the Arsacidæ which have been transmitted to us by the ancient historians are exceedingly vague, confused, and contradictory, and modern criticism has found itself unable to reconcile or simplify the conflicting statements. The most important members of the dynasty of the Parthian Arsacidæ were Arsaces I and Arsaces VI.—ARSACES (Gk. *'Αρσάκης, Arsakēs*) I delivered Parthia from the dominion of the Seleucidæ, kings of Syria. He is said by some to have been a Scythian by blood. An atrocious insult offered to his brother Tiridates by Pherecles or Agathocles, the Macedonian satrap of the country, is said to have fired his spirit and driven him to rebel. The Macedonians were expelled in 256 B.C. Antiochus Theos, King of Syria, was at war with Egypt, and was unable to recover this portion of his dominions. Seleucus, the son of Antiochus, made two unsuccessful expeditions against Arsaces, in the last of which he was taken prisoner. Arsaces I now acquired regal power, built a city called Dara, on the mountain Zapaortenon, developed the internal resources of his new kingdom, and endeavored to organize it; and, after the conquest of several countries, died at a great age. Such, at least, is the account given by Posidonius and other writers. Arrian, however, states that Arsaces died after a reign of two years, and that his brother Tiridates succeeded him, under the name of Arsaces II, and ruled for 37 years. From this we should infer that many of the acts attributed to the founder of the Parthian kingdom were the work of his successor.—ARSACES VI, or MITHRIDATES I, flourished about the middle of the second century B.C. He enlarged the territories of the Parthians by the conquest of Bactria and is even supposed to have penetrated into India and subdued the nations between the Hydaspes and Indus. In the year 138 B.C. he defeated and took prisoner Demetrius Nicator, King of Syria, whom, however, he treated generously, bestowing on him his daughter in marriage. He was a just and merciful prince.

**ARS AM'ATO'RIA, ARS AMAN'DI,** or **ARS AMO'RIS.** A famous work of Ovid, giving humorously a set of rules for the conduct of love affairs, how to gain and how to retain affection. Of the three books, two are addressed to men; the third, to women. The work has been characterized as "one of the supreme parodies in all literature." Consult a paper by E. K. Rand, entitled "Ovid and Metamorphosis," in *Harvard Essays on Classical Subjects* (Boston, 1912).

**AR'SENAL** (Fr., Sp., Portug. arsenal, dockyard; It. *arsenale, arzana, arzanale*, arsenal, dockyard; cf. It. *darsena*, Sp. *dársena*, Portug. *taracena*, dock, and Sp. *atarazana* (*l*), dock, all from Ar. *dār aççinā'ah*, workshop, factory, from *dār*, house + *al*, the + *çinā'ah*, art, mechanical industry). An establishment for the manufacture, repair, and storage of arms, ships, or munitions of war. In the United States the term is commonly applied to an establishment designed for the manufacture and storage of arms and munitions of war for the land forces; there are several naval arsenals, but these are merely storehouses for ammunition. In England the term has nearly the same signification. On the continent of Europe the original meaning of the term is preserved, and, while there are many arsenals designed solely for the supply of the

land forces, the great naval arsenals of Brest, Cherbourg, Toulon, Naples, Spezia, Venice, etc., are establishments in which ships are built, repaired, and fitted out, and in which equipments and naval stores are manufactured. The manufacture of guns is now generally carried on in gun factories and small-arms factories. (See ORDNANCE ESTABLISHMENTS.) Some of the non-explosive parts of ammunition are manufactured at the general arsenals, but the work of preparing explosives and of filling cartridges and explosive shells is commonly done at special arsenals or establishments at safe distances from centres of industry and population; and large quantities of ammunition are no longer stored in arsenals chiefly devoted to general military or naval industries. In the United States and in England the term *navy yard* (q.v.) corresponds almost exactly to that of *naval arsenal* on the Continent, the same class of work being carried on in each. A very large proportion of the munitions of war are now made in private works; and this, together with the desirability of specializing manufactures, has led to a reduction of the scope of work carried on in arsenals.

The first regular manufacture of war materials in the United States was in 1776, when gunpowder was made for the Continental forces; and in 1777 Springfield, Mass., was chosen by General Washington as a suitable place for an arsenal. The manufacture of small arms commenced there in 1787 and has since continued. Harper's Ferry Arsenal dates from 1795, from which time other arsenals were gradually built, until the list of arsenals, armories, and ordnance depots under the control of the United States War Department in 1913 comprised the following establishments: Allegheny Arsenal, Pittsburgh, Pa.; Augusta Arsenal, Augusta, Ga.; Benicia Arsenal, Benicia, Cal.; Columbia Arsenal, Columbia, Tenn.; Fort Monroe Arsenal, Fort Monroe, Va.; Frankford Arsenal, Philadelphia, Pa.; Indianapolis Arsenal, Indianapolis, Ind.; Kennebec Arsenal, Augusta, Me.; New York Arsenal, Governor's Island, New York City; Rock Island Arsenal, Rock Island, Ill.; St. Louis Powder Depot, Jefferson Barracks, Mo.; Sandy Hook Proving Ground, Sandy Hook, N. J.; San Antonio Arsenal, San Antonio, Tex.; Springfield Armory, Springfield, Mass.; United States Powder Depot, Dover, N. J.; Watertown Arsenal, Watertown, Mass.; Watervliet Arsenal, Watervliet, N. Y.

The naval gun factory is located in the Washington Navy Yard and forms the principal part of this yard's activities. The naval proving ground and powder factory is at Indian Head, Md. In naval magazines powder and explosives are stored, and ammunition is received, overhauled, loaded, and prepared for issue to ships. The naval magazines are located at Iona Island, N. Y., Dover, N. J., Fort Lafayette, N. Y., Hingham, Mass., Mare Island, Cal., St. Julien's Creek, Va., Fort Mifflin, Pa., Ostrich Bay, Puget Sound, Wash., Bellevue, Md., and Olongapo, P. I.

**AR/SENIC** (Gk. *ἀρσενικόν, arsenikon*, yellow orpiment from *ἄρσην, arsēn*, male, masculine; alluding to its strong properties). A widely distributed element that was known to the ancients, being distinctly referred to as early as 1694 by Schröder. It is often found in the form of mammillated or kidney-shaped masses, but occurs also in well-crystallized form. It is found chiefly associated with other metallic minerals in the older rocks or in schists. The principal European localities are: Andreasberg, in the Harz Mountains; Joachimsthal, in Bohemia, and Freiberg, in Saxony. It is also abundant in Chile, Mexico, and New Zealand. In the United States it is found in Haverhill and Jackson, N. H.; Greenwood, Me., and Leadville, Colo. In combination with sulphur, arsenic occurs as realgar and as orpiment, and with sulphur and iron as löllingite and as arsenopyrite or mispickel, called also arsenical pyrites. It is a common constituent of other minerals, but in small quantities only. The arsenopyrite is the usual commercial ore from which arsenic is obtained, and the process for its reduction is by heating the ore in earthenware retorts or tubes laid horizontally in a long furnace. As arsenic is quite volatile on heating, it condenses in the iron tube as a coherent crystalline mass, which may be still further purified by a second sublimation.

Arsenic (symbol As, at. wgt. 75.0) is a steel-gray, brittle metal, with a specific gravity of 5.23 to 5.76; it is a good conductor of electricity and is odorless and tasteless. It volatilizes above 100° C., with a garlic-like odor, and is rapidly vaporized at a dull-red heat. It is used as a constituent of alloys, as white alloy, as speculum metal, in bronzing brass, and in the manufacture of opal glass; also for hardening lead in the manufacture of shot. Arsenic and its soluble compounds are exceedingly poisonous.

Arsenic forms two oxides—the arsenic trioxide and the arsenic pentoxide. The former yields with basic radicals the salts called arsenites. It is commonly called *white arsenic*, arsenious acid, or flowers of arsenic, and is obtained in various metallurgical processes by roasting arsenic ores, during which the vapors of the oxide are volatilized and subsequently condensed in receptacles called poison chambers, or poison towers. The crude oxide is purified by one or more sublimations, yielding ultimately a white crystalline powder that is odorless, but has a weak, metallic, sweetish taste. This is the principal commercial compound of arsenic, and is used for the preparation of other arsenical compounds, in the production of green pigments, in the manufacture of glass, and as a poison for rats and vermin; also in medicine, in various compounds such as *Fowler's solution*, which is an arsenite of potassium. Arsenious oxide is used in medicine in treating many skin diseases, in anæmia, in chorea, in some forms of malarial fever, in cancer and other malignant growths, in neuralgia, in asthma, and in certain gastric conditions. It is an alterative and is frequently used in connection with other tissue builders or tonics during convalescence. Since small quantities produce poisoning, arsenic should be used only when prescribed by a physician. As this metal is much used in the arts, chronic poisoning by it is not infrequent, resulting in kidney disease and even paralysis. Yet it is asserted that in Styria the peasants consume arsenic daily—the women to improve their complexions, the men to increase their power of endurance. They are said to be strong and long-lived (see *Edinburgh Medical and Surgical Journal*, 1871, vol. xvi, p. 569). Freshly precipitated hydrated oxide of iron, and the freshly precipitated hydrated oxide of iron with magnesia, are regarded as the best and most efficient antidotes for arsenious acid; but immediate removal of the poison by vomiting or purging is desirable.

For the detection of arsenic, three methods are commonly employed. Of these, the first consists in the treatment of the material submitted for examination with a strong alkali, either potassium or sodium hydroxide, and passing through the filtered liquid a current of hydrogen disulphide, which, on acidulation if arsenic be present, produces a precipitate of the yellow sulphide. The precipitate may be further tested by dissolving in ammonia and evaporating until the residuary substance is reduced to metallic arsenic. Another method is the Reinsch process, in which, the preparation containing arsenic having been brought into solution, newly burnished pieces of copper foil are introduced into the liquid, and if arsenic be present it will at once be precipitated on the copper as a dark gray metallic film ($Cu_6As_2$). It is said that by this method one part of arsenic can be detected in 250,000 parts of solution. A third, and perhaps the most useful, method is that invented by Marsh, which consists in treating the material with dilute sulphuric acid and metallic zinc in a gas-generating apparatus. The arsenic combines with the hydrogen liberated by the zinc, and forms arsine ($AsH_3$) which is then passed through a glass tube; on heating, the gas decomposes, depositing metallic arsenic in the form of a "mirror" near the open end of the tube. In carrying out this operation, especially in criminal cases, the utmost precautions are necessary to insure the perfect freedom of the apparatus and reagents used from arsenic or similar substances capable of producing an arsenic-like "mirror." The nature of the mirror may be demonstrated by dissolving it and testing the solution obtained by one of the usual methods. With copper oxide, arsenious oxide forms a copper arsenite which is a pigment known as *Scheele's green*. With basic copper acetate it yields *Schweinfurth green*—called also emerald green, imperial green, and mitis green.

When acted upon by oxidizing agents, arsenious oxide yields arsenic oxide, which combines with basic radicals to form arsenates. Arsenic oxide, or arsenic acid, is sometimes used as an oxidizing agent in the preparation of aniline red.

Arsenic combines with sulphur, yielding an orange-yellow disulphide, which is found native as the mineral realgar and is used as a pigment and as a depilatory. A trisulphide also exists, which is found native as the mineral orpiment, used in pyrotechny and as a pigment for artists; also formerly in dyeing, and with quicklime as a depilatory under the name of *rusma*. Consult Valeur, *Chimie et toxicologie de l'arsenic et de ses composés* (Paris, 1904).

**ARSE'NIOUS AC'ID.** See ARSENIC.

**AR'SENOBEN'ZOL.** "606."—Ehrlich's specific for syphilis. See SALVARSAN; also SYPHILIS.

**AR'SENOPY'RITE** (from *arsenic* + *pyrite*), or MISPICKEL. An iron sulpharsenide that crystallizes in the orthorhombic system, has a metallic lustre, and is silver-white in color. It is readily recognized by its odor of garlic when struck a glancing blow with a hammer. Under an oxidizing blow-pipe flame it gives a white coat on charcoal and the characteristic garlic-like odor of arsenic. In Canada it occurs with sulphide of iron containing gold, forming large ore bodies, but no process has been developed for the commercial extraction of this gold. As a vein mineral it occurs associated with various ores of gold, lead, silver, and tin, in igneous crystalline rocks, and is recovered as a by-product, arsenious oxide, in the smelting of these ores.

**ARSINOË,** ar-sīn'ō-ē (Gk. 'Αρσινόη). A Greek feminine name which was especially popular in the Macedonian dynasty of Egypt, the family of the Ptolemies. The wife of Lagus and the mother of Ptolemy I was named Arsinoë. Other noteworthy princesses who bore the name were: 1. ARSINOË, who was the daughter of Lysimachus, the King of Thrace, and first wife of Ptolemy II Philadelphus. Her son Ptolemy, as Euergetes, later became King of Egypt. 2. ARSINOË II, born about 316 B.C., the daughter of Ptolemy I and Berenice. She was married in her sixteenth year to the aged Lysimachus, King of Thrace. The eldest son of this King, Agathocles, had previously married Lysandra, Arsinoë's half-sister. Arsinoë's brother, Ptolemy II Philadelphus, afterward wedded Arsinoë I (see above), the daughter of Lysimachus. Arsinoë II, wishing to secure the throne for her children, prevailed on her husband to put Agathocles to death. Lysandra, however, fled with her own children to Seleucus of Syria, and induced him to declare war against her father-in-law, who lost his life and kingdom. Arsinoë II sought refuge in Macedonia, which was also seized by Seleucus. After a few months Ptolemy Ceraunus, the half-brother of Arsinoë II, assassinated Seleucus; and in order to gain possession of Arsinoë's sons, whom he feared as rivals to his ambition, he offered marriage to his half-sister. She consented to the union and opened the gates of the town in which she had taken refuge, whereupon her suitor caused her sons to be killed before her eyes. Arsinoë fled to Egypt (279 B.C.). Her own brother, Ptolemy Philadelphus, banished his wife, Arsinoë I, to Coptos, and married Arsinoë II, beginning thus the series of sister-marriages which were in accordance with the Egyptian custom and exactly opposed to the Greek tradition. Arsinoë II had no children by her brother and adopted the three children of Arsinoë I. Her husband showed great affection for her. He named the capital of the Fayum (the Arsinoite nome) after her, and had a splendid tomb and memorial temple erected to her by the architect Dinochares, who is said to have roofed it with loadstones, so that her iron statue seemed to float in the air. She seems to have assisted Ptolemy in the government. 3. ARSINOË III was sister and wife of Ptolemy IV Philopator, who caused her to be murdered soon after the birth to her of an heir. 4. ARSINOË IV was daughter of Ptolemy XI, Auletes (80–51 B.C.). She fled from Alexandria when Julius Cæsar was besieged in it (48 B.C.) and was received as queen by the Egyptian troops so long as her brother, Ptolemy XII Dionysus, remained in the hands of Cæsar. Captured by the Romans, she was led in triumph through Rome; afterward she was liberated, and returned to Egypt. Her famous sister, Cleopatra VII, persuaded the Triumvir Antony to have her murdered at Ephesus (41 B.C.), although she had taken refuge in the temple of Diana.

**AR'SIS and THE'SIS.** See BEAT.

**AR'SON** (OF. from Lat. *ardere*, to burn, participle, *arsus*). In the laws of all civilized countries, a crime of the deepest atrocity. At common law, it consisted in the burning of the house of another, willfully and of malice aforethought, and was a felony punishable by death. In the long and painful history of the criminal

law it is said to have been the first offense in which the question of the *mens rea*, or criminal intent, of the act was taken into account. In essence the common law of arson remains substantially unchanged in the United States as well as in England, notwithstanding some statutory modifications and the general mitigation of the penalty incurred by the commission of the crime. Unless it results, directly or indirectly, in the death of some person—in which case it comes under modern definitions of the crime of murder—it is no longer punishable by death, but by imprisonment for periods varying with the degree or atrocity of the offense, sometimes for life. There must be an actual lighting and burning, in order to constitute the crime, and it must be deliberate, and not accidental, or the mere result of carelessness. The premises need not, however, be consumed, an actual blaze, ignition, or charring being enough. Generally speaking, it is not arson to burn one's own house, even with the intent to defraud an insurer, or to destroy the personal property of another on the premises; though this act, when done with such an illegal intent, was also a crime—usually a misdemeanor—at common law, and is now, in some of the United States, defined as a lower degree of the crime of arson. In New York it is arson, under the penal code, to set fire to any building, even though it be that of the accused, in which there is at the time a human being. For the particular treatment of this crime in this country, the reader is referred to the codes and statutes of the several States. Its early and later history has been fully told in Pollock and Maitland, *History of English Law* (Boston, 1899), and in Stephen, *History of the Criminal Law of England* (London, 1883). Consult also: Shephen, *Digest of the Criminal Law* (5th ed., London, 1894); Russell, *Treatise on Crimes and Misdemeanors* (6th ed., London, 1896); and the authorities referred to under CRIMINAL LAW.

**ARS POETICA** (The Poetic Art). A discussion of dramatic poetry by Horace, called also Epistle to the Pisos. In it Horace develops the laws of dramatic composition, and adds suggestions and comments from his own experience. See HORACE.

**ART** (Lat. *ars*). Broadly speaking, the word "art" stands for any object produced by the mind and hand of man; that which is not immediately a product of nature; that which is artificial, which is opposed to the natural, in the creation of which human skill has intervened. The shaft of a tree is natural; shaped as a ship's mast, and perhaps further ornamented, it has entered a low grade of art, the material grade, and has become useful. In the present discussion the word "art" is used in the sense of fine art, as opposed to the useful and industrial arts, and its end, unlike those, is to give pleasure. The kind of pleasure must, however, be somewhat closely defined, for its range and quality are not without certain limitations. For perhaps greater clearness it may be well to contrast the province of "fine art" with examples of other pleasure-giving activities of the human mind and of the lesser industrial arts. The appliances of science, light-producing, heat-producing, sound-transporting agencies, the results of mechanical or industrial arts, contribute to the pleasure, comfort, and sociability of life; but they are the result of applied and scientific principles and of the exact sciences, and for their appreciation do not call for that particular quality of pleasurable mental effort which the contemplation and knowledge and enjoyment of pure beauty exact and afford. There are many pleasures of which our human economy is susceptible that may not be ranked among the pleasures of art (see ÆSTHETICS); for the word "art" under this head is confined more strictly to its expression in painting and sculpture.

Art is perhaps entitled to be deemed the highest factor in civilized life, because it is the most unselfish. Sight is the sense it appeals to chiefly, but it is only that through this sense it may reach the mind; so it is a mistake to think that sculpture and painting end with visual enjoyment merely. There are higher and less high emotions to which art appeals, and it is the perceptible exercise of rare judgment and of taste that stamps a so-called work of art "fine." There are pictures existing, and examples even of musical composition, betraying a mind of such puerile character that the fact that they have been produced in obedience to the technical exactions of these respective arts in no way warrants them in being called "fine." Fine art consists not merely in technical address; and yet there is a certain perfection of *virtuosity* so intelligent, displaying such a rectitude of taste and such a refined instinct for the fitness of things that it is pleasure-giving to the degree of becoming æsthetic. Through "the happy and dexterous way in which a thing slight in itself is handled" it may become an object of "fine art." Material subjects also may serve as acceptable themes for the fine arts, if treated with such fitness that they do not offend the æsthetic sense. Veronese apotheosized the subject of feasting, not in itself a lofty theme. His, or any painter's, success in problems of this kind is a sign of the artist. True artists perceive the limitations of their art and never overstep them; and, indeed, fine art has to-day become synonymous with the exercise of fine taste in many departments of mental effort and individual handicraft.

It is very evident that the production of a work of high art which requires great abstraction of mind could never have occurred in the early and savage period of the human race. That was a period of self-preservation and a fight for mere existence. As time went on and life became more complex, there was leisure for the mind to employ itself in other matters; and with the complete emancipation of the human intellect, such as exists to-day, there has come an imperative demand for expression in a language that is as potent as that of uttered speech—the beautiful and universal language of art. In painting, its vocabulary is form and color; but these, in fine art, must be so used as to express the ideas and emotions excited in the artist by things seen. Imitation merely will not do this, so the artist must make use of seen things to denote certain attitudes of mind and emotions of the soul. A work of art must not so far stray from truthful representation as to irritate the mind of the beholder by its offenses against structural truth, but, on the other hand, art is not achieved through strict imitation. Art is many-sided—the æsthetic sensibilities are touched in such a variety of ways that it is somewhat difficult to fix definitely the channels through which painting and sculpture may legitimately reach the human mind and still rest within the limitations that these mediums exact on the part of the producer. It is certain, however, that the beholder of a

painting or statue should receive the impression of a mind employing the materials of a particular craft with perfect control and judgment, of a mind dominated by such taste that the language —that is to say, the medium used—is made to voice ideas that are better expressed by such means than by any other. Hence the objection to so-called "literary" art, or "story-telling" art, in pigment and in clay. Subjects which are more effectively rendered through verbal form, and which, to be understood pictorially, require a page of explanatory notes, are not so pleasure-giving, in the graphic arts, as those which immediately strike the mind, through the eye, by their elevation of sentiment and the opportunity they afford the artist for noble lines and charming qualities of paint. Both these arts are, as has been said, *imitative;* but the true artist recognizes in the exercise of his craft to what point his imitation of nature may legitimately carry him. This knowledge may be revealed to him by the consideration of the class of emotions it is his intention to excite.

**Bibliography.** Some of the best books are: Harris, *Theory of the Arts* (London, 1869); Frothingham, in *American Journal of Archæology*, vol. ix (1894); Taine, *Lectures on Art* (Eng. trans., New York, 1899); Leighton, *Addresses to the Students of the Royal Academy* (London, 1896); Conway, *The Domain of Art* (ib., 1901); Lange, *Das Wesen der Kunst* (Berlin, 1901); Von Kunowski, *Schöpferische Kunst* (Leipzig, 1902); Walter Crane, *Ideals in Art* (London, 1905); Clausen, *Aims and Ideals in Art* (New York, 1906); Delville, *The New Mission of Art* (London, 1910); Rodin, *L'Art* (Paris, 1911; Eng. trans., New York, 1912). Ruskin's works abound in art criticism, sometimes inspiring, often misleading. The most important passages have been collected by Street, *Ruskin's Principles of Art Criticism* (Chicago, 1901). See also the *Bibliography* under ÆSTHETICS.

**History.** The monuments produced by the artistic faculty represent in the most concrete form the different stages and kinds of human activity on its more ideal side, and are intimately connected with the two other main spheres of *science* and *industry,* to whose products art is often called upon to lend beauty and interest. Within the sphere of art itself the *social* arts of religion, philosophy, and government supply not only the *literary* arts, but also the *formative* arts of architecture, sculpture, and painting, with their themes and their inspiration, without which works of art would have little importance in the development of civilization. The fine arts, in order to attain a high standard, must therefore embody some higher idea. A Greek temple, a Gothic cathedral, a Mohammedan mosque, a Benedictine monastery, a triumphal arch, an amphitheatre, a Roman villa, a feudal castle, represent religious and social forces, above and beyond fine art, which mold these monuments so that they are part of the larger life. The form, arrangement, decoration, and purpose of such buildings are no part of "art for art's sake." So it is with works of sculpture and painting—with a Phidian Zeus, a Byzantine Christ, a Cimabue Madonna borne in triumphant procession, an Immaculate Conception by Murillo. Greek mythology and Christian dogma are as much embodied in art as in literature; art has been regarded for as many millenniums a means of teaching as it has been for centuries a means of pleasing. From the fact, therefore, that works of art, though produced under their own special organic laws, are governed by the general laws of the civilization to which they belong, it results that these works, like everything else in civilization, are a mixture of good and evil, true and false, and that the customary æsthetic opinion that beauty alone is the aim of art is contradicted by both theory and practice. Such a standard could not be applied to the novel or the drama in literature, as it would eliminate a majority of masterpieces; neither can it be applied in art. Any work with distinct significance and character is artistic, whether its theme is moral or immoral, its form beautiful or ugly, and whether it is inspired by a sentiment of the grotesque, the deformed, and the fearsome, or of the sublime and the beautiful.

A study of the history of art will show that through the 4000 or more years during which such works were produced before the fifth century B.C., the æsthetic pleasure they gave was practically independent of the human figure and was dependent on effects of color and material forms. Exquisite appreciation of color among the peoples of western Asia and grandiose combinations of architectural lines and masses among the Egyptians were the keynotes of this long period, of this lower and material stage, when the human figure was used as a higher species of hieroglyph, as a means, not an end. The long, painted processions in an Egyptian tomb; the friezes in relief of an Assyrian palace, were a part of ceremonial or contemporary history. In Greece of the sixth and fifth centuries, art enters upon a higher mission; this mission becomes both more definite and more ideal, centring around the human figure. It is the plastic stage of ancient art. Even in architecture questions of outline, proportion, and rhythm predominate, in place of the earlier material ideas of colossal mass. Color became subsidiary and remained crude, never attaining among the Greeks the harmony and subtlety of Asiatic art. The human form was for the first time idealized in plastic form and made to express types and thoughts besides mere external facts. The next change was heralded in the Alexandrine Age and fully embodied in Roman civilization. Art became pictorial and psychological; Greek simplicity became complex. Portraits replaced types; the variegated porphyries, serpentines, and other strong-colored marbles succeeded the white Parian; in place of the cameo-like Attic reliefs on a single plane without background we have first the picturesque scenery of the Alexandrine relief and then the two and three planes of the imperial Roman sculptures. Even architecture was fundamentally modified. The Hellenic Greeks had placed their buildings singly and with an unerring eye for beauty on the appropriate natural site; but each one was for itself. Under Rome, architectural composition is developed, and the grouping of coördinate structures, the planning of stupendous interiors, becomes a large part of the art, accompanied by wonderful richness of color in decoration. There is plastic loss and picturesque gain. In harmony with the new love of luxury, art is made to minister to private as well as to public life. Its bounds were thus immeasurably enlarged while its ideals were lowered. Philosophically speaking, the fit closing of an artistic era was now reached; all the changes had been rung.

When the Christian revolution set in, art was regenerated, as a consequence of the religious

and social regeneration. The second era began, of course, by a reconstruction in the higher spheres of religious and philosophic thought and the state; until their currents could reach and revivify the fine arts, until new artistic forms could be created to express suitably these new ideas, the result was necessarily inadequate, as it had been for example, in the centuries of Greek art before Phidias. As a natural reaction from the previous worship of beauty of form, Christian art went at first to the other extreme of caring merely for the content. The decay of skill went with a carelessness as to its acquisition. Like the Egyptians and Assyrians, the artists of the early Christian and Byzantine periods used figures largely as hieroglyphs, for purposes of instruction, but the things taught were fundamentally different; they were the things of the spirit. A true history of Christian sculpture and painting up to the Renaissance should deal but little with the technique and mainly with the theme, not with the æsthetic pleasure, but with the internal significance. Imperfection of form was regarded as immaterial. This point of view once secured, it becomes clear how we should study the frescoes of the Catacombs to reach the heart of Christianity before the stage of theological definitions; how the dogmas and beliefs of the Eastern church are set forth in illuminated Bibles and in the mosaics and frescoes of Byzantine churches, from St. Mark at Venice, and from Monreale to Mount Athos; how the encyclopædic learning and dominant thoughts of the Middle Ages can be grasped in the sculptures and glass windows of such French Gothic cathedrals as Chartres, Rheims, and Amiens. The intellectual quality of this art is shown in the supremacy of geometric law and constructive thought in an architecture which is the embodiment of the triumph of mind over matter—the antipodes of Egyptian architecture. During this pre-Renaissance period there was the greatest variety of stages; in the West the only time when the external expression was adequate to the ideas involved was the period of the Gothic cathedrals, which in many ways was the exact counterpart of the Hellenic development of the fifth and fourth centuries B.C. (Phidias to Lysippus), in the same way as the earlier Christian period had corresponded to the Oriental stage and the later Renaissance period was to mirror the Roman stage of ancient art. It is interesting to follow out this analogy; to see how portraiture, psychologic study, picturesqueness, and the supremacy of painting are characteristics of the Renaissance as of Roman art, but on another plane, in which the keynote was furnished, not by architecture, as with the Romans, but by sculpture.

The Renaissance is the last and pictorial stage of the second era in art history. Michelangelo was its supreme embodiment, the Sistine ceiling its clearest expression. Renaissance architecture was plastic, not constructive—a decorative system. The simple composition, the clear outlines of the painting of the fifteenth and sixteenth centuries have also a plastic underlying basis. At this moment we have hardly enough perspective to see clearly just where the Renaissance merges into modern art, but one thing is certain, modern art carries the standard of painting in the van. It has not yet created its own types of architecture or decorations; in these spheres it lives mainly on models of the past. We may, however, speak of a distinctly modern sculpture, and present-day painting is truly original.

**Plan of Art Articles in the New International Encyclopædia.** The details illustrating the historic development of the fine arts are given in both general and special articles. The present article, and those on ÆSTHETICS, PRIMITIVE ART, and ARCHÆOLOGY, are designed as a general introduction. There follow three general historic sketches on ARCHITECTURE, SCULPTURE, and PAINTING and two of lesser length on ENGRAVING and DECORATIVE ART. They are all designed as distributive articles for the more detailed sub-headings and special articles, and are supplemented by two classes of general articles; those on great historic styles broader than nationalities, and those on national styles. To the former belong Byzantine, Mohammedan, Romanesque, Renaissance, and Baroque art, which spread over several countries. Within such styles there are, of course, the national subdivisions; but these are subordinate to certain general laws or characteristics of the style. Thus French Gothic and Renaissance are very distinct from Italian and German; Armenian and Coptic Byzantine from Hellenic; Persian and Spanish Mohammedan from Egyptian. The second class, of national arts, is especially important in ancient times before the Greeks had drawn the East and West so close together. So, Egyptian art and Assyro-Babylonian art possess distinctly national styles. Minor nationalities like the Hittites and Phœnicians are, it is true, strongly influenced in their art by elements borrowed from these two great civilizations; but not sufficiently so as to cast national traits into the shade.

The next group of articles gives classes of general subheads: (1) of *style*—as, for instance, of Doric, Ionic, and Corinthian under ORDERS OF ARCHITECTURE; of early English Decorated and Perpendicular under DECORATED STYLE; PERPENDICULAR; (2) of *branches of art* from the point of view of material; for instance, CARPENTRY and MASONRY, as branches of architecture; BRONZE, CHRYSELEPHANTINE, TERRA-COTTA, IVORY, WOOD CARVING, and GOLDSMITH'S WORK, as branches of sculpture; FRESCO, TEMPERA, OIL PAINTING, WATER COLOR, PASTEL, ILLUMINATED MANUSCRIPTS, as branches of painting; LINE ENGRAVING, ETCHING, WOOD ENGRAVING, DRY POINT, AQUATINT, MEZZOTINT, as branches of engraving; MOSAIC, STAINED GLASS, POTTERY, VASES, ENAMEL, INLAY, JEWELRY, etc., as forms of decorative art; (3) of *classes of monuments* from the point of view of their use. Under ARCHITECTURE, the general headings of *religious*, *civil*, and *military*, where these themes are treated historically, are each subdivided: religious architecture into such heads as TEMPLE, CHURCH, CATHEDRAL, MONASTERY, BAPTISTERY; civil and domestic architecture into such as MUNICIPAL ARCHITECTURE, FORUM, PALACE, FOUNTAIN, VILLA, MAUSOLEUM, THEATRE, AMPHITHEATRE, CIRCUS, BATH, TOWN HALL, ARCH TRIUMPHAL, AQUEDUCT, BRIDGE; military architecture into such as ACROPOLIS, CITADEL, CAMP, CASTLE. Certain subtitles are somewhat more special than these; such as the names of structures confined to a certain style, like OBELISK, MASTABA, and PYRAMID in Egyptian art, or those confined to a religious sect and style, like ALCAZAR, CARAVANSERAI, KHAN, MINARET, and MOSQUE in Mohammedan art, or CATACOMBS, BASILICA in Early Christian art; such also are subordinate buildings or parts of buildings, like CLOISTER, CHAPTER-HOUSE, and DORMITORY, which

are parts of a monastery, or KEEP, BAILEY, TOWER, BASTION, and BARBICAN, which are parts of a castle; APSE, CHOIR, NAVE, TRANSEPT, CRYPT, CLEARSTORY, which are parts of a church. Similar classes of works obtain also under sculpture and painting. For example, in sculpture come PULPIT OR AMBO, TOMB, RELIQUARY, CHALICE, CROSS, HERM, etc.; in painting are such terms as MURAL PAINTING, TRIPTYCH, etc. Of great importance for *painting* is the classification (4) in accordance with the *general subject* represented under such headings as PORTRAITURE, LANDSCAPE, and STILL-LIFE PAINTING. The next class (5) includes *works of sculpture and painting* classified according to subject, the general rules of which are laid down in two general articles, one on MYTHOLOGY IN ART, for the ancient world, and one on Christian ICONOGRAPHY, for the period beginning with the Christian era. The history of the artistic treatment of each such important theme is given under separate heads, which are enumerated in these two articles. Such are the myths and types of the Olympian gods, the chief exploits of personages like HERCULES, THESEUS, and PERSEUS, and the heroes of the *Iliad* and of Greek tragic poets, not to mention great historic personalities. Similarly, for Christian art, the types and events of the life of Christ, the Virgin and the Apostles are described in such general articles as CHRIST IN ART and MADONNA, and in themes like ANNUNCIATION, NATIVITY, ADORATION OF THE KINGS, CRUCIFIXION, LAST SUPPER, ASCENSION, and LAST JUDGMENT.

Class (6) *technique of the arts*, comprises the greatest number of separate heads. The processes of sculpture are explained under CARVING, FOUNDING, RELIEF SCULPTURE, and in the introduction to SCULPTURE; those of painting under DRAWING, PERSPECTIVE, ENCAUSTIC PAINTING, TEMPERA, FRESCO, OIL PAINTING, etc. Other technical terms referring to the painter's craft are CANVAS, EASEL, GROUND, PAINTERS' COLORS, etc. Of the architectural titles several of the articles are of some length, such as COLUMN, DOME, ARCH, VAULT, MOLDING, including both definition and history, but the majority consist of definitions, as in the case of such architectural members as ARCHITRAVE, FRIEZE, and CORNICE, composing the classic entablature, as well as DENTILS, FASCIA, CORONA, MUTULES, details of this entablature, and CABLE MOLDING, PALMETTE, and its other moldings and ornaments. Reference to the comprehensive articles will secure complete references to the smaller units. The great majority of such technical terms belong to the field of architecture, and include all the building implements under such heads as AXE, DRILL, HAMMER, CRANE, DERRICK, DRESSINGS, STAGING, QUARRY.

Class (7) is concerned with the *appreciation and enjoyment* of the fine arts under such general titles as ARCHITECTURE, APPRECIATION OF; PAINTING, do., SCULPTURE, do., and in special articles like LINE, COLOR, COMPOSITION, CHIAROSCURO, PERSPECTIVE, VALUES. Class (8) consists of articles illustrating *manners and customs* in which art and artistic forms of industry have at least an important part. Some are general, historic, and descriptive, as COSTUME, FURNITURE, BURIAL, BRICK, ARMOR, JEWELRY, and under such headings will be found references to the more specific headings; in this field especially it is impossible to distinguish between art and archæology. The next series, class (9), consists of a *topographical* treatment of monuments. In the case of every city or town containing monuments of unusual importance and significance in art history, the conventional guide-book information, which is sufficient in ordinary cases, is abandoned for a systematic, scholarly treatment. Such is the case in cities like VENICE, ROME, ATHENS, CAIRO, FLORENCE. It is the same with places like POMPEII, which illustrate any period with great fullness. Ancient sites that are now mere ruins —like BAALBEK, PALMYRA, BABYLON, SELINUS, CARNUNTUM—are described. Even single works are picked out for separate description; ancient monuments, such as the PARTHENON and the PANTHEON; the Egyptian temples at EDFU, KARNAK, and PHILÆ; the mediæval monasteries of MONTE CASSINO, CERTOSA, CLUNY, MELROSE; the chateaux of CHAMBORD, CHENONCEAUX; the villas MEDICI, LANTE, GIULIA; the palaces of the DOGES, the PITTI, STROZZI, LOUVRE, LUXEMBOURG, TUILERIES; the churches ST. PETER, ST. PAUL; the ALHAMBRA, and many more. Finally, class (10) comprises the *biographies* of the most prominent personalities in art history, not merely the men who are popularly known, but all those who have contributed original work. The most important are enumerated in the general articles ARCHITECTURE, PAINTING, SCULPTURE, etc.; and in those on the great historic styles, such as GREEK, GOTHIC, and RENAISSANCE ART. Details have been in each case reserved for the biographies.

To recapitulate, access to the mass of articles can be had by simply passing systematically from the more general to the more special in each branch, each article having a list of references, and the whole series being arranged so as to secure a complete mosaic picture, which can be supplemented by the use of the bibliographical lists at the close of the general articles.

TABLE OF ART HISTORY

ORIENTAL

| | |
|---|---|
| Babylonian | (c.6000–500 B.C.) |
| Egyptian | (c 5000– 50 B C.) |
| Assyrian | (c.1500–600 B.C.) |
| Hittite | (c 1500–700 B.C.) |
| Phœnician | (c.1500– 50 B.C.) |
| Jewish | (c.1000 B.C.– 70 A.D.) |
| Persian | (c. ? B.C.–600 A.D.) |
| Chinese | (c 2000 B.C.–1800 A D.) |
| Japanese | (beg. c.600 A.D.) |
| Indian | (beg. c.500 B C.) |

WESTERN

| | |
|---|---|
| Ægean | (c.2500–800 B.C.) |
| Greek | (c.1000–100 B.C.) |
| Etruscan | (c.1000–200 B.C.) |
| Roman | (c.300 B.C –400 A.D.) |

CHRISTIAN

| | |
|---|---|
| Early Christian | (c.100– 800 A.D.) |
| Byzantine | (c.400–1450 A.D.) |
| Romanesque | (c 800–1200 A D.) |
| Gothic | (c.1150–1450 A.D.) |
| Renaissance | (c.1400–1700 A.D.) |
| Modern | (c.1700–present.) |

**History of Art.** The output of literature on this subject during recent years perhaps equals in volume all that has been heretofore done. The best brief manuals of a popular character are those by Goodyear (New York, 1889); Lübke (2 vols., Stuttgart, 1873; latest Eng. trans., New York, 1904); Turner (London, 1903); Rosenhagen (Bielefeld, 1908); and Reinach, *Apollo* (Paris, 1904; Eng. trans., New York, 1907), the clearest and most practical of all. More extensive and scholarly are the works by Schnasse, *Geschichte der bildenden Künste* (8 vols., Dusseldorf, 1866–79); Knackfuss

and Zimmermann, *Allgemeine Kunstgeschichte* (2 vols., Bielefeld, 1900); Carrotti, *History of Art* (2 vols., Eng. trans., London, 1908—). The best and most modern productions, each volume or section written by the highest authorities, are: Woermann, *Geschichte der Kunst aller Zeiten und aller Volker* (3 vols., Leipzig, 1900–11); Springer, *Handbuch der Kunstgeschichte* (5 vols, Leipzig, 1904–07); and André Michel, *Histoire de l'art*, thus far five volumes, each in two parts (Paris, 1905—). Histories of art based upon reproductions are those of Winter and Dehio (5 vols., Leipzig, 1900–02), Neuwirth (Munich, 1910—), and especially the series edited by Ludwig Justi (3 vols. thus far, Berlin, 1910—), with introduction and commentaries by specialists.

The history of art has also been treated in its principal divisions, as in the *College Histories of Art*, edited by J. C. Van Dyke; architecture, by Hamlin (New York, 1909); painting by Van Dyke (ib., 1904); sculpture by Marquand and Frothingham (ib., 1911). The titles of such works, as well as those composing the series of national arts, such as the *Geschichte der deutschen Kunst*, edited by Dohme, the *History of American Art*, edited by Van Dyke, will be found in the bibliographies of ARCHITECTURE, PAINTING, SCULPTURE, ENGRAVING, ETC. Works on the principal chronological divisions of art, ancient, mediæval, and modern, are those of Reber, *History of Ancient Art* and *History of Mediæval Art* (Eng. trans., New York, 1887) and (best) Perrot and Chipiez, *Histoire de l'art ancien* (7 vols., Paris, 1881—).

**Artist Biographies.** These may be best consulted in the dictionaries. The briefest for ready reference is Spelman, *Kunstlexicon* (Berlin, 1905); somewhat longer are Muller and Singer, *Allgemeines Künstlerlexicon* (6 vols. and supplement, Frankfort, 1895–1906), and Bénézit, *Dictionnaire des peintres, sculpteurs, dessinateurs et graveurs* (2 vols., Paris, 1911—). By far the most scholarly and comprehensive of such works is Thieme and Becker, *Allgemeines Lexicon der bildenden Künstler* (Leipzig, 1907—). The work as planned will have about 150,000 titles. Artist biographies are published in many separate volumes and usually popularly written; such as *Great Masters in Painting and Sculpture*, edited by Williamson (London, 1900—), *Les maitres d'art* (Paris); *Künstler Monographien*, ed. Knackfuss (Bielefeld, 1895—), and *Klassiker der Kunst* (Stuttgart), the last two having excellent reproductions. This is also the principal feature of the periodical publication, *Great Masters in Art* (Boston), the text of which is composed of selections from standard works. For biographical dictionaries of special divisions of art, such as Painting, Sculpture, Engraving, consult the bibliographies under these titles.

**Art Periodicals.** Besides giving all kinds of artistic news, these publications often contain important articles of research. The principal in English are: *Art Journal* (London, 1839—); *Studio* (London, 1893—), published also in New York as the *International Studio*, with important American additions; the *Connoisseur* (London, 1901); the *Burlington Magazine* (ib., 1903—), and *Art* (New York, 1913—). Among those in German are *Zeitschrift für bildende Kunst* (Leipzig, 1866—); *Repertorium für Kunstwissenschaft* (Stuttgart and Berlin, 1876—); *Jahrbuch der königlich preussischen Kunstsammlungen* (Berlin, 1880—); *Jahrbuch der Kunstsammlungen des allerhöchsten Kaiserhauses* (Vienna, 1883—). The French periodicals include *Gazette des Beaux-Arts* (Paris, 1859), with its supplement *Chronique des Arts* (ib., 1875) and the *Revue de l'Art* (ib., 1897). The chief Italian are *L'Arte* (Rome, 1898—), *Rassegna d'Arte* (Milan, 1901—), and *Bolletino d'Arte* (Rome, 1907—).

**ART, PRIMITIVE.** The motives which lead to the production of works or art and the capacity for æsthetic enjoyment seem to be common to men at all levels of culture. We cannot speak, then, of the origin of art in an absolute sense, but only of the first stages of development both in artistic production and in æsthetic appreciation. It is difficult to tell just what primitive peoples themselves regarded as beautiful. Even when we have laid before us articles which seem to involve appreciation of the beautiful—as, for example, carved figures on weapons and cooking utensils—and even when we read of the war-dance or the corroboree, or of the practices of tattooing or scarring, it is not easy to tell what emotions were aroused in the primitive mind by the contemplation of these things. A symmetrical spear was more useful than a crude asymmetrical one; a dance may have been intended to appease some god or to bring luck in hunting, as the buffalo dance of some Indian tribes; a series of figures on a bone knife may have been a kind of picture writing; it may have been a mark of individual or tribal ownership; or the figures on a bit of pottery may have simply copied the woven pattern of a more primitive utensil. So that we must distinguish what was done from utilitarian, or religious, or social motives, or for communication, or from simple habit, from what was the result of æsthetic impulses. As a matter of fact, it is highly probable that for a long time purely æsthetic impulses and purely æsthetic productions were rare—that a thing was at once useful and artistic, or religious and artistic, or social and artistic. It is, then, one of the chief problems which artistic origins furnish, to disentangle the æsthetic from the non-æsthetic. For this two things are required. The investigator must know the essential ingredients of the æsthetic consciousness, both on its productive and on its contemplative side, and he must know where the most primitive conditions are to be found. The first requirement is psychological. It takes into consideration the elementary æsthetic feelings (see ÆSTHETICS, EXPERIMENTAL), other feelings, emotions, and organic sensations, and the general and special associative factors (brought from the experiences of the individual and of the social group to which he belongs) in the more complex judgments of taste. The second requirement is anthropological. It asks: "What is a 'primitive people'? What is 'primitive culture'?"—assuming that the most primitive art is to be found on the lowest level of civilization. Perhaps the best guide to the primitiveness of a tribe or race is to be found in its means of livelihood. Hunting and fishing evidently take lower rank than agriculture or cattle-raising. They imply simpler social conditions and a lower grade of mental development. Fortunately, some of the hunting tribes are still in existence and offer object-lessons in primitive culture. Among them there is almost no social organization, and life is reduced to extremely simple conditions. Even here, how-

ever, evidences of artistic appreciation are by no means rare.

The chief modes in which primitive man expressed his love for beauty are by ornament and in the dance. Painting, plastic art, literature, and music were not, however, entirely lacking. A passion for bodily adornment is characteristic of primitive man. He smeared his body with red, yellow, black, and white cosmetics, tattooed and scarred himself, loaded himself with nose, lip, and ear rings, necklaces of shell and bone, bracelets and anklets, and arranged his hair in the most fantastic fashions; clothing, even, was worn more for adornment than as a covering to the body. As civilization advanced, ornament migrated from the body to the implements and utensils and to the clothes, displaying itself in rich and variegated garments such as are to be seen to-day in the royal attire of Oriental monarchs and in the holiday dress of peasants. From clothing it passed to the decoration of the home, to places of worship, and to public buildings. This is a natural sequence of the widening of the individual's interests in the development of a highly organized society.

An expression of the primitive artistic impulses, which has a greater social significance than ornament, is to be seen in the dance, which was more truly a matter of æsthetics than it is in civilized communities. The essential element in it was energetic and rhythmic movement. It was either simply gymnastic, giving free play to muscular activities, or mimetic, reproducing the actions of beasts and birds and portraying the emotions of love and war. The paintings, drawings, and carvings of primitive tribes furnish a less important means of expression. They are represented by the rock pictures of the Australians, the bone carvings of the Eskimos, and the drawings of the Bushmen. They are remarkable for their careful and faithful representations of natural objects—largely animals—with which the artist was familiar. Their excellence is to be attributed to the careful observation and the manual dexterity which distinguishes the hunter from the agriculturist. Even the drama and the art of poetry are represented among primitive peoples. A limited number of poems have been collected which are real expressions of emotion and which attempt metrical form. Love and nature are seldom employed as themes. The poet sings, by preference, of himself. But the form, rather than the matter, seems to be the essential æsthetic element; since meaningless syllables, in many instances, take the place of words, while the rhythmical movement of the verse has been carefully preserved and retains its original emotive value. The drama grew naturally out of the dance and song. Pantomimic dramas came very early. They have been found among the Australians, the Eskimos, and the Tierra del Fuegians. With the drama comes the song, which is likewise related very intimately to the dance. It has even been said of some primitive peoples that they never dance without song and never sing except in the dance. Thus we see that music, too, has a prominent place in their lives. It is without doubt true that the voice was the first musical instrument, and that the cadences of emotional utterance, the sounds of nature, and the construction of crude musical instruments—the drum, the flute, and the trumpet—all conduced to the development of music. Primitive music is characterized by melody in which the rhythmic element (made precise by the dance) is far in advance of the harmonic element. The intervals are fewer in number than with us and not so sharply defined, while polyphony is practically unknown. See MUSIC.

Consult: Grosse, *The Beginnings of Art* (New York, 1897); Tylor, *Anthropology* (New York, 1889); Hirn, *The Origins of Art* (London, 1900); Wundt, *Die Kunst* (Leipzig, 1908).

**ART, SCHOOLS OF.** See DESIGN, SCHOOLS OF.

**ARTA,** är'tà (the ancient *Ambracia*). An episcopal city of upper Epirus (Map: Greece, C 2), situated 10 miles from the northern coast of the gulf to which it gives its name and 39 miles south of Janina. It stands on the left bank of the river Arta, the ancient *Arachthus*, whence the modern name, which was first used in the eleventh century. It is surrounded by groves of orange trees, gardens, and vineyards; has a considerable trade in wine, agricultural products, tobacco, and fruit, and manufactures cloths and leather. The ancient Ambracia (Ambrakia) was settled by the Corinthians about 640 B.C. and later became an independent republic. It was the capital of Epirus under Pyrrhus; its decline was begun by its seizure in 189 B.C. by the Romans, and its importance was utterly destroyed when Nicopolis was settled (31 B.C.). The city received a new lease of life under the Byzantine emperors, and in the thirteenth century was the capital of the Despot of Epirus. After various changes of rulers Arta became in 1449 a Turkish possession and remained such. It was ceded to Greece as a result of the Treaty of Berlin in 1878. Pop., 1896, 7582; 1907, 8000.

**ARTA, GULF OF** (anciently, Lat. *Sinus Ambracius*). An arm of the Ionian Sea, 25 miles long and 10 miles wide, penetrating into the western coast of Greece and nearly bisected by 39° N. lat. A bar at its entrance detracts from its usefulness. It is noted as the landing place of Philip V of Macedonia (218 B.C.), during the war with the Achæan League, and for the naval battle of Actium fought at its mouth 31 B.C.

**AR'TABA'NUS** (Gk. *Ἀρτάβανος, Artabanos*) (?–226 A.D.). The last King of Parthia. After his kingdom had been devastated by the army of Caracalla Artabanus gave battle to Macrinus, near Nisibis (217). After two days of desperate fighting the Romans were defeated and peace was concluded. During the war Artabanus lost his best troops, and the Persians seized the opportunity of recovering their independence. Led by Artaxerxes (Ardashir), the founder of the dynasty of the Sassanidæ, they defeated the Parthians in three great battles, in the last of which Artabanus was taken prisoner and killed (226). This ended the kingdom of the Aracidæ, which had existed about 475 years. Consult Gutschmid, *Geschichte Irans*.

**AR'TABA'ZUS** (Gk. *Ἀρτάβαζος, Artabazos*). The name of several distinguished Persians in the times of the Achæmenidæ. When Xerxes advanced against Greece, it was an Artabazus who led the Parthians and Chorasmians. He later warned Mardonius against engaging in battle at Platæa, and on the first indications of defeat he withdrew his own division, amounting to 40,000, from the field, and succeeded, though with great difficulty, in forcing his way through the wilds of Thessaly, Macedonia, and Thrace to Byzantium, where he crossed to Asia. Subsequently he acted as negotiator between the Spartan Pausanias and Xerxes. Another Ar-

tabazus was general under the Persian King, Artaxerxes Mnemon, and revolted against Artaxerxes Ochus in 356 B.C. For this offense he appears to have been forgiven, and subsequently we find him accompanying Darius Codomannus after the battle of Arbela. On the murder of the King Artabazus attached himself to Alexander, who rewarded his fidelity by appointing him satrap of Bactria.

**ARTAGNAN, D'**, där'tä'nyäN'. The hero of Dumas's *Trois mousquetaires, Vingt ans après,* and *Le Vicomte de Bragelonne.* He is chiefly known in modern times as a well-drawn character in these novels; and the Gascon adventurer who goes to Paris to seek his fortune, winning his way by his sword, his genius for intrigue, and the aid of his three friends, Athos, Porthos, and Aramis, is among the most popular heroes of fiction, both on and off the stage. But he was also an actual historical personage of note. Charles de Baatz de Castelmore, Count d'Artagnan, was born in 1611 or 1612. By 1654 he had risen to be captain in the Guards. When the musketeers were reëstablished in 1657, he was made *sous-lieutenant;* but as the nominal head of the corps, the Duke de Nevers, paid no heed to his duties, he was practically its commander-in-chief, becoming actual *capitaine-lieutenant* in 1667. His most noteworthy official act was the arrest of the all-powerful minister, Fouquet, in 1661. He was made *maréchal-de-camp* (brigadier-general) in 1672, and fell in June of the following year at the siege of Maestricht.

**ARTAN'THE.** See MATICO.

**AR'TAPHER'NES,** or **AR'TAPHRE'NES** (Gk. *'Αρταφέρνης, 'Αρταφρένης*). A Persian general, who, with Datis, commanded the Persian army that invaded Greece (490 B.C.) and was defeated at Marathon. He led the Lydians and the Mysians in the expedition of Xerxes against Greece in 480 B.C.

**ARTAX'ATA** (Gk. *'Αρτάξατα,* Armen. *Artašat*). The ancient capital of Armenia, on the Araxes, where Hannibal took refuge when Antiochus could no longer protect him. The Carthaginian is said to have superintended the building of the city, which was named from the King Artaxais I about 180 B.C., on the site of an older city, Armavir. It was destroyed by the Romans (58 A.D.), rebuilt by Tiridates, and called Neronia, in honor of Nero, who had granted the kingdom to Tiridates. It was taken and partly destroyed by the Persians in 370, and in 450 it was the seat of an ecclesiastical council, over which Joseph, the patriarch, presided. The ruins of the city are now called Ardashir.

**AR'TAXERX'ES** (Gk. *'Αρταξέρξης,* OPers. *Artaxšaθra,* 'whose kingdom (*xšaθra*) is right (arta)'). The name of three of the ancient Persian kings of the Achæmenian dynasty. (See ACHÆMENES.) The same title, under its later and changed form of Artakhshatar, or Ardashir, reappears as the name of three sovereigns of the Sassanian dynasty. (See SASSANIDÆ.)—The first of the ancient monarchs of the name is ARTAXERXES I, surnamed Longimanus, or *Μακρόχειρ,* from the Persian Dirāzdast, 'the long-handed.' Whether this designation referred to an actual physical peculiarity or to the extent of his empire is uncertain. He was the son of Xerxes I, and he ruled over Persia, 465–424 B.C. The Egyptian revolt which broke out in the first part of his reign was suppressed about 455. The hostilities which existed between Persia and Greece were checked by the victory which the Hellenic arms gained over the Persian forces in Cyprus (449), and a truce was arranged on the initiative of Artaxerxes. During his reign the Peloponnesian War in Greece broke out (431). Artaxerxes died at the close of the year 425, or in the beginning of the year 424, on the same day as his wife Damaspia. His name is preserved on a tablet which he caused to be inscribed in the palace at Persepolis, and it has been found also on a porphyry vase.—ARTAXERXES II, surnamed Mnemon, from his tenacious memory, was a grandson of the preceding, and son of Darius II, whom he succeeded as King of Persia 404–358 B.C. He is the most important of the three kings of the name; and he is best known to history because of the revolt of his brother, Cyrus the Younger, which resulted in the battle of Cunaxa (401) in which the latter was killed, as described by Xenophon in the *Anabasis.* Artaxerxes rebuilt the royal palace at Susa, and his inscriptions mention the Zoroastrian divinities Anāhitā (see ANAÏTIS) and Mithras, which fact is of interest in regard to the question of his faith. His life is included among Plutarch's biographies.—ARTAXERXES III, or Ochus (OPers. *Vahuka*), son of the preceding, and King of Persia 359–338 B.C. He was the contemporary of Philip of Macedon. Ochus was a weak and despotic ruler, enough proof of which was given by his behavior when he subdued Egypt, about 345. His policy throughout was largely guided by his shrewd and influential eunuch Bagoas, at whose hands, through poison, he ultimately lost his life.

**ARTEDI,** är-tā'dē, PETER (1705–35). A Swedish naturalist. He was born at Anund, Sweden, Feb. 22, 1705, and studied at Upsala, where he and Linnæus became youthful friends. Resolving to reform the existing systems of classification, Artedi gave his attention to fishes and Linnæus to plants. He was drowned at Leyden, Sept. 21, 1735. At the time of his death he left materials for his *Ichthyologica,* which Linnæus edited and published, together with a life of the author, in 1738. A new edition appeared in 1788, and a part of it was expanded and reissued, edited by Schneider, in 1789, under the title *Synonomia Piscium.* According to Cuvier, the great work of Artedi is the first named, which gave a truly scientific character to the study of fishes. The only error of any magnitude which occurs in it is the inclusion of the Cetacea among fishes. Artedi was also a distinguished botanist. He was the first to indicate, as a special characteristic, the presence or absence of involucra in the umbelliferous plants, whose species are so difficult to distinguish from each other. Linnæus named a genus of these, in memory of his friend, *Artedia.*

**AR'TEGAL.** The personification of justice in the *Faerie Queene.* The character is also supposed to represent Lord Grey, Spenser's patron.

**ARTEL,** är-tyĕl'. The Russian name for a *gang.* It refers especially to associations of independent laborers working collectively on a job and dividing the profits. It is a primitive form of coöperative production, which sometimes resembles the old trade-guild and is still in existence among the fishermen of Archangel. Among the peasants in agricultural labor the artel has been largely displaced by the contract system, though they are still organized on the coöperative basis sometimes for the purchase of provisions. See GANGS, AGRICULTURAL.

**AR'TEMIDO'RUS** (Gk. *Ἀρτεμίδωρος, Artemidōros*). A geographer and native of Ephesus, who lived about 100 B.C. On one occasion he was sent to Rome to recover certain temple treasures which had been wrongfully appropriated by the Roman officials. In recognition of his success on this embassy, his townsmen erected a golden statue to him. His travels extended through the lands bordering on the Mediterranean Sea and the less distant parts of the Atlantic Ocean and the Red Sea. The *Γεωγραφούμενα, Geōgraphoumena*, in 11 books, was a comprehensive work on the geographical, physical, historical, and political features of the most important countries of Europe, Asia, and Africa, and was based on the author's own investigations and a study of the works of Timosthenes, Eratosthenes, Polybius, Agatharchides, and others. It was much used by later authors, but only fragments, fortunately numerous, have come down to us. An epitome of the work was made by Marcianus of Heraclea, which, too, has been lost. Artemidorus wrote another book called *Ἰωνικὰ Ὑπομνήματα, Ionika Hypomnēmata*. He seems to have been much influenced by Polybius.

**AR'TEMIS.** See DIANA.

**ARTEMISA**, är'tā-mē'sà, or **ARTAMISA**, är'tà-mē'sà. A town of Cuba, in the province of Pinar del Rio, situated about 45 miles by rail southwest by west of Havana (Map: Cuba, C 4). It carries on a considerable trade in sugar and tobacco. Pop. (latest report), 1899, 4179.

**ARTEMISIA**, är'tē-mĭsh'ĭ-à (Gk. *Ἀρτεμισία*). The name given to festivals of the Greek goddess Artemis (see DIANA), held in all quarters of the Greek world. One of the most important of such festivals was held at Ephesus. There the statue of the goddess, equipped with bow and arrows and draped with the skin of a wild beast, was carried in procession; young women, representing nymphs, danced, and contests of various sorts were held.

**ARTEMISIA** (Lat., Gk. *Ἀρτεμισία*, probably from being dedicated to Artemis). A genus of plants of the family Compositæ, in which the flowers of the disk have stamens and styles and are either fertile or abortive, those of the ray pistillate and fertile. The heads of the flowers are numerous and small; the leaves are generally much divided. There are many species, herbaceous plants and shrubs, natives chiefly of the more temperate regions of the Eastern Hemisphere and the western United States. They have generally an aromatic smell, more or less agreeable, and a warm, sometimes rather acrid and bitterish taste. To this genus belongs wormwood (*Artemisia absinthium*), the *apsinthion* of the ancient Greeks, to whom its medicinal properties were well known. It is a native of Great Britain, the continent of Europe, and the northern parts of Asia, growing in waste places, by waysides, etc. It is a perennial, 2 to 4 feet high; its leaves are bipinnatifid and clothed with a silky down, and its small, hemispherical drooping heads of flowers are of a dingy yellow color and are produced in axillary panicles. It is aromatic and bitter, containing a bitter principle and an essential oil, on account of which it was formerly used in medicine in various forms (oil, extract, tincture, etc.), as a stomachic and anthelmintic or vermifuge, and as a febrifuge. Sea wormwood (*Artemisia maritima*, including a variety which has been called *Artemisia gallica*), a native of salt-marshes in Great Britain and other parts of Europe, possesses similar properties; as also Roman wormwood (*Artemisia pontica*). a native of the middle and south of Europe, but not of Great Britain; Tartarian wormwood (*Artemisia santonica*), a native of Tartary, Persia, and other parts of the East; and Indian wormwood (*Artemisia vulgaris*), a native of the Himalayas, abounding at elevations of 2000 to 6000 feet. Indian wormwood grows to the height of 12 feet. It is considered in India a powerful deobstruent and antispasmodic. Tree wormwood (*Artemisia arborescens*), a native of the south of Europe and the Levant, is also larger and more shrubby than the common wormwood. The dried flower-buds of a number of species of artemisia are sold under the names of wormseed and have long been in much repute as anthelmintics. *Artemisia pauciflora*, known as Levant wormseed, contains the crystalline principle santonin employed in medicine as a vermifuge. *Artemisia absinthium*, from which the bitter aromatic liquor called *extrait, eau*, or *crême d'absinthe* is prepared, is a small, low-growing species, as are *Artemisia mutellina, Artemisia glacialis, Artemisia rupestris, Artemisia spicata*, etc., found on the Alps, and known to the inhabitants by the name of *genipi*. Mugwort (*Artemisia vulgaris*), a common native of Great Britain and of the continent of Europe, often found about ruins and in waste places, grows to the height of 3 or 4 feet, has pinnatifid leaves and panicles of small yellow flowers. It emits, when rubbed, an agreeable smell and has a bitter taste. In Germany the young shoots and leaves are used in cookery for seasoning. It is used also for the same medicinal purposes as wormwood, but is weaker. Its leaves, and those of some of the other species, are used as fomentations for cleansing and healing wounds. Southernwood (*Artemisia abrotanum*) is a shrubby plant with long, straight stems 3 to 4 feet high, the lower leaves bipinnate, upper leaves pinnate. It is a native of the south of Europe and middle parts of Asia and has long been a favorite plant in cottage gardens in Great Britain. It has an aromatic and pleasant odor. The leaves are used to drive away moths from linen, and in some parts of the Continent as an ingredient in the manufacture of beer. The smell of this plant appears to be peculiarly disagreeable to bees, which retreat from it; and a little branch of southernwood is sometimes used when they are swarming, to promote their ascent into the new hive. Tarragon (*Artemisia dracunculus*) is a perennial plant, a native of Siberia, and long cultivated in gardens in Great Britain. It has a branching stem 1 to 1½ feet high, with narrow leaves. It is fragrant and has an aromatic smell and taste. The leaves and tender tips are a favorite ingredient in pickles. An infusion of the plant in vinegar is used as a fish sauce. The leaves of *Artemisia maderaspatana* or *Grangea maderaspatana* are regarded in India as a valuable stomachic and are also used in anodyne fomentations. Moxa (q.v.) is prepared by the Chinese from the leaves of *Artemisia moxa* and other species. In the western United States many shrubby species exist and are known as sagebrush. One of the most common is *Artemisia tridentata*, with small, wedge-shaped leaves, 3- to 7-notched. *Artemisia cana*, silvery sage, *Artemisia mexicana*, white sage, and *Artemisia ludoviciana*, prairie sagebrush, are other important range species. Certain varieties of the

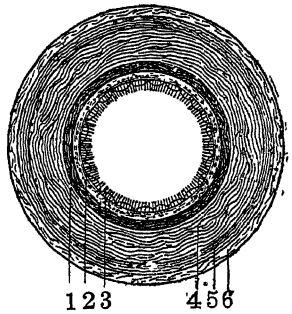
sagebrush are important winter forage for sheep, and are occasionally eaten by cattle under the spur of starvation. The so-called "black sage," which occasionally reaches 10 feet in height, is, in many of the more isolated portions of the western United States, the only fuel of the settlers. See Plate of DESERT PLANTS.

**ARTEMISIA** (Gk. *Ἀρτεμισία*). 1. A queen of Halicarnassus in Caria, and a vassal of the Persian King, who joined the fleet of Xerxes in the expedition against Greece, and distinguished herself by bravery and skill at the battle of Salamis (480 B.C.). The Athenians, indignant that a woman should appear in arms against them, offered a reward of 10,000 drachmæ for her capture, but she escaped. According to a doubtful tradition, Artemisia afterward jumped from the Leucadian Rock, in consequence of a disappointment in love. 2. A daughter of Hecatomnos and wife of Mausolus, of Mylasa, her own brother. She followed Mausolus, in 353 B.C., as a ruler of the satrapy of Caria, and with energy and skill thwarted an effort of the Rhodians to free themselves and surprise Halicarnassus, the capital of the satrapy. She completed the famous Mausoleum, and died in 351, according to tradition, of grief at the death of her husband.

**ARTEMISIUM**, är'tê-mĭsh'ĭ-ŭm (Gk. *Ἀρτεμίσιον, Artemision*). 1. The stretch of coast at the northern extremity of Eubœa, opposite the Thessalian Magnesia. It belonged to the town of Histiæa, and was named from the temple of Artemis, which stood here. Off this point occurred the first naval conflict between the Greeks and the Persians at the time of the invasion of Xerxes. 2. A mountain 5400 feet high between Argolis and Arcadia, between Mantinea and Argos, now called Malewo. On the summit was a temple of Artemis. 3. A promontory and temple of Artemis in Caria. 4. A small city in Sicily, near Mylæ, in which was a famous temple of Artemis Phakelitis.

**ARTE'RIOSCLERO'SIS** (Gk. *ἀρτηρία, artēria*, artery + *σκλήρωσις, sklērōsis*, induration). A disease of the arteries beginning in the internal coat (*intima*) as a chronic inflammatory process and finally resulting in hardening of the muscular elastic coat. The connective tissue of the walls is increased in quantity. This produces a contraction, by pressure, on the blood vessels supplying the artery, which in turn causes weakening and degeneration of the walls of the vessel. It loses its elasticity, becomes hard and rigid, and is easily ruptured. If the degeneration takes place in spots or mainly involves one of the arterial coats, with the production of fatty degeneration and subsequent deposit of lime salts in the walls of the vessel, it is termed *atheromatous*, from atheroma (Greek *athērē*, meal), the name of the fatty or chalky substance. At times the increase in the amount of connective tissue is so great that the lumen of the blood vessels is obliterated. The causes of arteriosclerosis are chronic alcoholism, gout, lead poisoning, syphilis, deficient metabolism from habitual overeating, overwork of the heart, and kidney diseases. Vital statistics show a steadily increasing proportion of deaths from heart and kidney diseases, associated with arteriosclerosis, in modern city dwellers, a state of affairs believed to be dependent on sedentary existence, combined with overeating and drinking, and the worries incident to the complicated economic problems of modern life. Experimental injection of bacterial cultures and toxins into the wall of the aorta have resulted in the production of aortitis, the most marked changes being in the middle coat, where calcareous deposits occurred. The close resemblance of these results to natural pathologic conditions suggests infection as a possible cause. See ARTERY.

**AR'TERY** (Lat. *arteria*, Gk. *ἀρτηρία, artēria*, wind-pipe, artery). In anatomy any vessel through which the blood passes from the left side of the heart to the tissues, from the old idea that these tubes were air-carriers because they are empty after death. In its structure an artery may be roughly subdivided into three layers, called coats: an external, elastic and distensible, the *tunica adventitia;* a middle, muscular coat, the *tunica media:* an internal, smooth and transparent, lined with endothelium, the *tunica intima.* The tube is also enveloped in a layer of cellular tissue, termed the *sheath.* When an artery is wounded by a sharp instrument, the effect varies with the direction of the cut. If longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse the edges gape, and a nearly circular orifice allows of a profuse hemorrhage. If the artery be completely divided, its walls do not collapse like those of a vein; the cut orifice contracts, and also retracts into its sheath; this checks the flow of blood, a clot of which shortly forms on the outer side; then another forms inside the vessel, and together they stem the flow till the cut edges of the artery have time to throw out lymph (see ADHESION), and heal as other wounded tissues. When an artery is compressed by a ligature, the brittle inner and middle coats crack, curl inward, and unite. See BLEEDING.




SUBDIVISIONS OF ARTERIAL WALL.

1. Endothelial layer.
2. Fenestrated membrane.
3. Muscular layer.
4. Elastic layer.
5. Fibro-connective layer.
6. Areolar sheath.

The arteries of the human body are all offshoots of the aorta. As each main trunk passes into a portion of the body, it divides into superficial and deep branches which anastomose freely, so that the tissues are not dependent for their supply on a single arterial trunk.

**Diseases of the Arteries.** The diseased conditions affecting the arteries consist of (1) degeneration of the arterial walls (either fatty, calcareous, or hyaline); (2) arteriosclerosis; and (3) aneurism. *Fatty degeneration* of the *intima* (inner coat) is very common. It occurs as yellowish spots in the aorta and larger vessels. *Calcareous degeneration* succeeds the fatty change, and occurs as flakes or plates of chalky deposit in the *intima.* It is the terminal stage of arteriosclerosis. *Hyaline degeneration* is a

change usually found at the beginning of arteriosclerosis. It occurs as a smooth, homogeneous substance replacing the *tunica intima*, generally distributed throughout the smaller arteries and capillaries, especially in the kidney. The substance which replaces the normal tissue of the arterial coat is called *atheroma* (from Greek *athērē*, meal), whether hyaline, fatty, or calcareous; it consists of a pulpy or hardened mass of cholesterine, oil, albuminous and chalky material. In some arteries, such as those over the temples and at the wrists, chalky deposits or atheromatous thickening may be felt easily. Atheromatous deposit is at first attended with a narrowing of the calibre of the vessel, varying with the thickness of the deposit, and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, while the larger arteries may be very much contracted. A later consequence is dilatation of the vessel, and this again may terminate in aneurism. The arteries sometimes become abnormally lengthened and consequently not only dilated but tortuous. Another condition involving much danger is this: a calcified artery loses the smoothness which the interior of the vessel ought to present, rough projections form, upon which the fibrin of the blood may be deposited in small clots; these, becoming detached, may be carried with the blood till they become arrested and plug up an artery, giving rise to embolism or thrombosis. A blow may crush a diseased artery, when a healthy elastic vessel might have escaped injury. A ligature applied to a calcified artery is apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due. The heart's action in pumping blood through stiff, unyielding arteries whose calibre is diminished causes a permanent rise in the blood pressure, resulting in hypertrophy of the heart, disease of the kidneys, cerebral hemorrhage, aneurism, gangrene, or sclerosis of the coronary arteries. *Arteritis*, or *inflammation of the arteries*, is no longer recognized as a distinct disease. See ARTERIOSCLEROSIS; HEART; KIDNEYS; APOPLEXY; ANEURISM; GANGRENE.

**ARTESIAN** (är-tē'zhan) **WELLS** (from the old county of *Artois*, Lat. *Artesia*, now part of France, where the oldest well in Europe was bored in 1126). Vertical borings into the ground, to a depth of 100 feet or more for the purpose of obtaining water from some deeply buried porous stratum, such as sandstone or gravel. In the true artesian well the water should flow to the surface, but at present the term "artesian" is applied to any deep well, even where the water is obtained by pumping.

The presence of an artesian water supply in any region depends upon the existence beneath that region of a tilted porous layer, inclosed between two impervious beds. The outcropping edge of the porous bed must, moreover, be of sufficiently open texture to soak up the rain which falls upon it, and furthermore there must be no escape of the contained water from the lower portions of the bed. It is therefore evident that when such a porous stratum is saturated with water, the latter will be under pressure, the pressure at any one point amounting to that of a column of water whose height is the difference between the altitude of that point and the altitude of the outcrop of the water-bearing layer. If now from a point on the surface, at a level lower than that of the outcrop of the porous stratum, a drill hole be sunk to the water-bearing bed, a flow of water will be obtained, but the water will seldom rise to the same level as the point of intake owing to the friction which has to be overcome in flowing through the porous bed. The most favorable conditions are when the rocks form a basin, or when the inclined porous layer passes into an impervious one. The collecting area, or region drained by the porous stratum may be in the immediate vicinity of the well (a common case in shallow wells) or it may be at a distance of several hundred miles. In boring for artesian water a knowledge of the geological structure of the region is of highest importance. The work of the United States Geological Survey, aided by data obtained from wells already bored, has demonstrated the existence of several extensive and well-marked artesian water-yielding areas. Thus a large part of Nebraska, South Dakota, eastern Colorado, and northwestern Kansas obtains its artesian water from the Dakota sandstone, the collecting area of which is around the base of the Black Hills in South Dakota and along the eastern foothills of the Rocky Mountains. The Iowa wells derive their water from the St. Peters sandstone, whose collecting area is in Wisconsin. Along the Atlantic coast many wells obtain a supply of pure water from the southeasterly dipping Tertiary and Cretaceous beds underlying that area.

Artesian wells in all parts of the country yield a supply of water for domestic use, which in many instances is much purer than surface water. In the arid regions of the West they also serve the purpose of supplying water for irrigation, thus rendering fertile the soil of many districts otherwise non-productive.

The Chinese were acquainted with artesian wells, and in Europe they have been used for centuries — in France, England, Austria, and Germany; indeed, the basin-shaped structure of the Paris and London areas, with their alternating beds of clay and sand, has yielded the type structures for artesian water supply. Portions of the Sahara Desert have been reclaimed by artesian water derived from wells sunk by the French government. The effect of these wells has been materially to benefit the country and also to change the character and habits of its nomadic Arab inhabitants. Several tribes are said to have settled down around these artificial springs, and to have constructed villages, planted palms, and entirely renounced their previous wandering existence.

Many artesian wells have been driven to a great depth, their diameters varying from 3 to 6 inches, several such deep borings having been made in the United States; e.g., at St. Louis, Mo. (3843.5 feet); Columbus, Ohio (2775⅛ feet); Louisville, Ky. (2086 feet); West Chicago, Ill. (3081 feet); Galveston, Tex. (3071 feet); Pittsburgh, Pa. (4625 feet). At Wheeling, W. Va., there is a dry well 4500 feet in depth, which has furnished valuable records of temperature changes in the earth's crust. Among the noted foreign wells is one at Passy, near Paris, 1923 feet deep; Sperenberg, near Berlin, 4194 feet; Schladenbach, near Leipzig, 5735 feet.

The temperature of artesian well waters is commonly about 40° to 50° F., except in the case of deeper wells, whose waters may reach a temperature of 70° to 80°. The water from a well at Charleston, S. C., registers 87°. In

some places these hot waters are used for heating buildings, as at Grenelle, Paris. The Grenelle well-water has a surface temperature of 81.70° F.

Cases are not infrequent where artesian waters are charged with gases such as carbon dioxide or hydrogen sulphide; or they may contain mineral substances in solution, thus at times serving as medicinal waters.

The methods adopted for boring artesian wells are similar to those employed in drilling oil wells. (See WELL SINKING.) The cost is commonly from $2 to $3 per foot for the first 1000 feet, and 50 cents greater per foot for each additional 500 feet. Artesian wells commonly show a gradual decrease in flow, due either to partial filling of the tube, or to reduction of pressure because of the boring of new wells in the same vicinity, or to exhaustion of the basin. More precise information regarding the distribution and characteristics of the artesian waters of different portions of the United States may be found in the bulletins and annual reports of the United States Geological Survey and of the geological surveys of various States, particularly those of Iowa, New Jersey, Mississippi, and Missouri.

**ARTEVELDE,** är'te-vĕl'de, JACOB or JAMES VAN (c.1290–1345). A popular leader of the Flemings. The war between England and France having threatened the cloth industry of Flanders, Artevelde was persuaded to lead the Flemings against the encroachments of Count Louis of Flanders, the vassal of the French King. In December, 1337, he assumed the leadership, and, with the aid of the men of Ghent, freed the town from the nobles and adherents of the Count. Afterward Artevelde was elected captain-general of the town of Ghent. In 1338 he made a commercial treaty with England, but maintained the policy of armed neutrality. Edward III of England, wishing to gain him as an ally, landed at Sluys, but was resisted. Edward's first campaign proving successful, Philip of Flanders refused to recognize the neutrality of the Flemings, thus forcing them to declare for the English. Artevelde now urged Edward to assume the title of "King of France," and the Flemings, in 1340, accepted Edward as their liege lord. The chief power remained in the hands of Artevelde. On July 24, 1345, he was slain in a popular tumult at Ghent, presumably because he intended to recognize the Black Prince as Count of Flanders.

ARTEVELDE, PHILIP VAN, son of Jacob, born about 1340, entered public life in January, 1382. Differences had again arisen between the Flemings and Count Louis. Under Yoens, the former burned the Count's favorite castle and set up the standard of revolt. Yoens dying the same year, Peter van den Bossche became leader; but, as affairs seemed to be going badly for the revolt, Artevelde was chosen chief captain. By severe discipline and skillful tactics he defeated the Count's forces and entered Bruges; but, in November, Charles VI brought a great army from France. Artevelde took his stand at Roosebeke, but was defeated and slain, Nov. 27, 1382.

Sir Henry Taylor published a drama entitled *Philip van Artevelde* (London, 1834). Consult Ashley, *James and Philip van Artevelde* (London, 1883), and Hutton, *James van Artevelde* (London, 1882).

**ARTFUL DODGER, THE.** The nickname of John Dawkins, one of the band of youthful pickpockets maintained by Fagin the Jew, in Dickens's *Oliver Twist*.

**ARTHOIS,** är'twä', JACQUES D' (1613–86). A Flemish landscape painter. He was born at Brussels and modeled his art upon that of the pupils of Rubens. His pictures, the subjects of which are derived principally from the forests and environs of Brussels, are characterized by great facility of execution, but lack fidelity to nature. The figures in his landscapes are often painted by such able artists as Teniers, Pierre Bout, and Van der Meulen. His paintings are numerous in the galleries at Madrid, Brussels, and Vienna, and in various French and German museums.

**ARTHRI'TIS** (Gk. *ἀρθρῖτις*, joint disease, gout, from *ἄρθρον*, *arthron*, joint). An inflammation of the joints, arising from wounds, bruises, or surgical operations, and sometimes without apparent cause. It frequently follows a bacterial infection. All, or a part, of the joint may be involved. The main symptoms are swelling, pain, heat, and redness. The diseases with which arthritis is commonly associated are gout, rheumatism, gonorrhœa, tuberculosis, syphilis, pyæmia, and typhoid fever. Acute and chronic forms are recognized. The usual treatment in acute cases is compression by cloths wet with cold water, rest, cooling diet, and sedatives. Counter-irritation by means of iodine, turpentine, or mustard, may be of service in chronic or subacute cases. Sometimes cupping or leeching may be indicated. See GOUT; SYNOVITIS.

**ARTHROP'ODA** (Gk. *ἄρθρον*, *arthron*, joint + *πούς*, *pous*, foot). One of the phyla of animals. They are bilaterally symmetrical, and the body is divided into segments, of which each typically carries a pair of jointed appendages. The brain lies dorsal to the food canal and is connected with a ventral chain of ganglia. The body is covered with a fine chitinous cuticle, periodically molted. The Arthropoda are descended from the Annulata, from which they differ chiefly in the jointed appendages, which are used largely as walking, instead of merely swimming, appendages, and they have advanced beyond the annelids in the specialization of the segments and appendages, so that in general, head, thorax, and abdomen may be distinguished. The head always bears a pair of jaws and at least one pair of antennæ, except when, as in spiders, these are rudimentary or altogether gone. The abdomen is usually devoid of developed appendages; when present, these have other functions than locomotion. Sense organs are usually well developed, except in the parasitic forms. The eyes are either simple and placed directly above the brain, or compound, and are sometimes placed on movable stalks. The mouth is usually provided with one or more pairs of appendages; the intestine may be coiled, and excretory organs occur chiefly either as specialized tracts or as diverticula of the midgut, or as tubular special glands. An incomplete blood system is present, but veins are often lacking, and the blood returns through the general body spaces. The dorsal vessel functions as a heart and may become very short and specialized. Reproduction is usually bisexual, but parthenogenesis occurs. During development repeated moltings (ecdyses) occur, often associated with profound changes in form; from molt to molt constitutes a larval "stage."

**Classification.** Class I. *Crustacea*, divided into *Entomostraca*, of small size and a variable number of segments, and *Malacostraca*, usually of large size, with 20 segments in the trunk (ex-

cepting one small and rare group, Nebalia). Orders of Entomostraca: Phyllopoda (fairy-shrimps), Trilobita (fossil), Ostracoda, Copepoda (water-fleas), Cirripedia (barnacles). Chief orders of Malacostraca: Isopoda (sow-bugs), Amphipoda (beach-fleas), Cumacea, Stomatopoda (mantis shrimps), Schizopoda (shrimps and prawns), Decapoda (lobsters, crayfish, crabs).

Class II. *Arachnida*—Orders: Scorpionida (scorpions); Pseudoscorpionida (book scorpions); Pedipalpida (scorpion spiders); Solpugida (Galeodes); Phalangida (harvestmen); Araneida (spiders); Acarida (ticks and mites); Xiphosura (king crab).

Class III. *Onychophora*, containing only Peripatus.

Class IV. *Myriapoda* (Centipeds, etc.).

Class V. *Insecta*—Orders: Aptera (spring-tails and silver-fish); Orthoptera (cockroaches, grass-hoppers, etc.); Neuroptera (dragon-flies, May-flies, caddis-flies, etc.); Hemiptera (bugs); Diptera (gnats and flies); Lepidoptera (butterflies and moths); Coleoptera (beetles); Hymenoptera (bees, wasps, etc.).

**Bibliography.** References to books will be found under various articles describing groups or species of Arthropoda. Consult, as general works, particularly the series "Cambridge Natural History," and Parker and Haswell, *Text-book of Zoölogy* (London and New York, 1897); Lankester, Hutton, and others, "Are the Arthropoda a Natural Group?" in *Natural Science*, vol. xi (London, 1897); Kingsley, "Classification of the Arthropoda," in *American Naturalist*, vol. xxviii (Philadelphia, 1894).

**AR'THROSPORES** (Gk. *ἄρθρον, arthron*, joint + *σπόρος*, seed). A name applied to the resting cells of certain of Blue-green Algæ. In *Nostoc* the ordinary working cells form a filament that resembles a string of beads. When the conditions for work begin to be unfavorable, certain cells enlarge, accumulate reserve food, and become thick-walled. These cells (the arthrospores) are able to endure cold or drought; and upon the return of favorable conditions the heavy wall is broken through, and work is resumed. These "arthrosphores," therefore, are not real spores, but are simply protected working cells.

**AR'THUR.** A half-legendary king of the Britons, supposed to have reigned in the sixth century. He was the great national hero of the British Celts and became the central figure of one of the principal cycles of mediæval romance. Nothing is absolutely known of his history, and his existence has sometimes been denied altogether. The more usual view, however, recognizes at least an historic starting point for the great body of tradition that centres in his name. In accordance with a favorite theory of modern mythologists, Arthur is often regarded as a combination of an actual British hero with one or more ancient Celtic gods. Thus, Professor Rhys, who connects Arthur's name with an Aryan root which means 'to plow,' thinks that some elements in his legend belonged originally to a culture-god described on Continental inscriptions as Mercurius Artaois, or Mercurius Cultor, while perhaps other elements were derived from an old sky-god, a kind of Celtic Zeus.

The usual account of Arthur, as given by Geoffrey of Monmouth, is briefly as follows: He was the son of Uther Pendragon, King of Britain, and Igerne, the wife of the Duke of Cornwall, whose union was effected by a device of Merlin the Wizard. After the death of the Duke, Uther made Igerne his queen, and in due time Arthur succeeded to the throne. Upon becoming King, Arthur at once took the lead of his people in their wars with the Saxons and defeated the invaders on every hand. Encouraged by victory, he extended his conquests to Ireland, the Orkneys, and even to Norway and Gaul. Meanwhile he established a great court at Caerleon-on-Usk, where, with his Queen Guinevere (or Guanhumara), he was surrounded by a grand assemblage of knights and kings. After a time a message came from the Emperor of Rome demanding tribute, and Arthur, ably supported by Gawain, conducted a successful expedition against the forces of the Empire. In the midst of his victories on the Continent Arthur was recalled to defend his kingdom and Queen from the traitorous Modred, who had seized upon both in his absence. Arthur undertook to put down the rebellion, and in the first battle his forces were victorious, but Gawain was slain. Then, in the battle at the river Camel, Modred was defeated and killed, but Arthur himself was grievously wounded and carried off to the island of Avalon to be healed. The hope was long cherished by the British people that Arthur would some day return and restore them to power.

Much of this narrative is obviously unhistoric, and very little of it can be traced with certainty to sources older than the ninth century. The first recorded mention of Arthur is in the *Historia Britonum* of Nennius, who lived about the year 800. He is there described as a *dux bellorum*, who, along with other leaders of the Britons, fought 12 battles against the Saxons. The *Annales Cambriæ* (contained in a MS. of the tenth century) also mention him, giving the year 537 as the date of his death. The *Vita Gildæ* (preserved in a twelfth century MS.) speaks of him as a king of all Britain. But not till we come to the *Historia Regum Britanniæ* of Geoffrey of Monmouth (which already existed, in some form, as early as 1139) do we find the more fully developed story of which an outline has just been given. The question with regard to Geoffrey's sources is very difficult and may never be fully settled. The later chroniclers —Wace, Layamon, Robert of Gloucester, and the rest—for the most part repeat the same account with minor modifications. Thus Wace (who wrote in 1155) first mentions the Round Table, an element which he surely did not invent, but must have derived from current Celtic traditions.

It was not in the chronicles, however, that the material about Arthur found its fullest and best expression. The fame of his court was most widely celebrated in the romances of chivalry. Of this class of literature one of the earliest and greatest representatives was the French poet, Chrestien de Troyes, who wrote in the latter half of the twelfth century. He had many followers in France, and the French romances were widely translated and imitated in the other European languages. The relation between the romances and the chronicles is not entirely clear, but the latter cannot be looked upon as the source of any considerable part of the material in the former. In the romances less attention is paid to Arthur and his conquests, and far more to the lives and exploits of his several knights; so that the King, while remaining the central figure of all the poems, is the hero of hardly any. Gawain, Ywain, Lancelot, and Perceval are cele-

brated in turn, until they, too, give place to new knights, the favorites of new poets. Most of the earlier romances (like those of Chrestien) were metrical; but the stories soon began to be worked over in prose, and finally great prose cycles were written, in which the scattered episodes were woven together with as much consistency as could be obtained. The great example in English of this stage of development is the *Morte d'Arthur* of Sir Thomas Malory, which has been the source of Arthurian lore most consulted by English readers and writers since the fifteenth century.

The origin of the material in the romances and the manner of its transmission have long been the subject of voluminous discussion. Some scholars have maintained that there is nothing distinctively Celtic in the cycle beyond the names, the geographical setting, and an occasional incident. Others, holding the stories to have been in large part the property of the Celtic races, have discussed whether they were transmitted to the French poets in England or on the Continent, whether through the Armoricans or through the Welsh. Each of these theories of transmission has at present its adherents among scholars; but in the course of recent investigations the Celtic character and origin of the great body of the material has been steadily made clearer. The "matter of Britain" has not been misnamed. Unfortunately the remains of early Welsh literature are scanty, and little or nothing can be learned from them of the direct sources of the Arthurian stories. But the national hero tales of the Irish have been preserved in large quantities from very early times, and a comparison of this saga material with the mediæval romances has developed many striking parallelisms which cannot be explained except by some theory of common origin. The pursuit of this line of investigation has yielded most important results in the last few years.

The story of Arthur and his Round Table has been less treated in modern than in early English literature. Still, it has engaged the attention of great poets. Spenser introduced Arthur into the *Faerie Queene*, but preserved very little of the substance of the old romances. Milton and Dryden both planned Arthurian epics and then gave them up for other subjects. The romantic revival of the nineteenth century brought the "matter of Britain," along with other mediæval subjects, once more to the front. A number of episodes from the cycle were treated by the lesser poets of the period, and Tennyson produced in the *Idylls of the King* what is now without doubt the best-known version of these ancient tales.

**Bibliography.** On the history and mythology: J. Rhys, *The Hibbert Lectures* (London, 1886); *Studies in the Arthurian Legend* (Oxford, 1891); H. Zimmer, *Nennius Vindicatus* (Berlin, 1893); Fletcher, *The Arthurian Material in the Chronicles* (Boston, 1906); Pokorny, *Die Ursprung der Arthursage* (Vienna, 1909); W. Lewis Jones, *King Arthur in History and Legend* (Cambridge, 1911). On the transmission of the material of the romances: Gaston Paris, *Histoire littéraire de la France*, vol. xxx (Paris, 1888); Zimmer, *Göttingische Gelehrte Anzeigen* (Göttingen, 1890); Engel, *Die Einflüsse der Arthur-romane auf die Chansons de Geste* (Halle, 1910); also a series of articles by Paris and others in *Romania*, vols. x (Paris, 1881) and following. The works of Chrestien were edited by W. Förster (Halle, 1884–99) and selections from his romances have been translated by W. W. Newell in *King Arthur and the Table Round* (Boston, 1897). On the romances consult also: Paris, *Les romans de la Table-Ronde* (Paris, 1868–77), Ward, *Catalogue of Romances in the Department of Manuscripts in the British Museum* (London, 1883), and Sommer, *The vulgate version of the Arthurian romances, ed. from MSS. of the British Museum*, vols. i–vi (Washington, 1908–13); for the early Welsh poetry, Skene, *The Four Ancient Books of Wales* (Edinburgh, 1868); Maclean, *The Literature of the Celts* (Glasgow, 1906); and for the bearing of Irish literature on the Arthurian question, A. C. L. Brown, *Ywain: A Study in the Origins of Arthurian Romance* (Boston, 1902); for a discussion of later Arthurian literature, MacCallum, *Tennyson's Idylls of the King and Arthurian Story from the Sixteenth Century* (Glasgow, 1894), and Maynadier, *The Arthur of the English Poets* (Boston, 1907). See AVALON; MABINOGION; PERCEVAL; TRISTRAM.

**ARTHUR** (1187–1203). Duke of Brittany, grandson of Henry II of England and nephew of Richard I, Cœur-de-Lion. In 1194 he was proclaimed Duke of Brittany. On Richard's death in 1199 the nobles of Anjou, Touraine, and Maine refused to recognize John and became the vassals of Arthur. He was knighted by Philip II of France and invested with Brittany and other French possessions appertaining to the English crown. In the same year John landed in Normandy. In support of Arthur Philip took the field against him. Soon, however, Philip's unscrupulous conduct gave offense to the Angevin friends of Arthur, and in 1200 a peace was concluded between John and Philip. In 1202 war again broke out. Poitou rose in insurrection against England, and Arthur, who had marched to besiege the castle of Mirabeau, was taken prisoner. He was removed in 1203 to Rouen, where he mysteriously disappeared—drowned, some said, by John's own hands. The story of Arthur appears in Holinshed. Shakespeare, in *King John*, used Holinshed as a basis, but supplemented the old chronicle with imaginative details of his own. See JOHN.

**ARTHUR, CHESTER ALAN** (1830–86). The twenty-first President of the United States. He was born at Fairfield, Vt., Oct. 5, 1830, of Scotch-Irish parentage. He graduated from Union College in 1848, began the practice of law in 1853 and soon became conspicuous at the bar of New York. In the decade before the Civil War his professional reputation was assured by his share in the famous Lemmon Case, involving the validity, under certain conditions, of the Fugitive Slave Law, and by his management of the case, which resulted in securing a verdict from the highest court of the State that a slave brought into New York while in transit from one slave State to another was, ipso facto, free. In the period of the war he served at different times as inspector-general and as quartermaster-general of the State of New York, and gained wide recognition for his particularly effective work in preparing the New York troops for the field. Having identified himself with the Republican party in its early days, he obtained from President Grant in 1871 the highly desirable office of Collector of the Port of New York, and four years later his administration of the office was indorsed by a reappointment. His relations with practical

politics and his attitude toward civil-service reform not tending long to maintain harmony between himself and the incoming administration, he was removed from office by President Hayes. The power of his friends, however, was such that in 1880, partly as a concession to the unsuccessful supporters of Grant, he was nominated for the vice-presidency, and upon his election to that office manifested an activity in senatorial politics quite unusual with vice presidents. In the factional fight for the control of the New York patronage, he continued in alliance with Roscoe Conkling, the leader of the "Stalwart" faction, against the "Half Breeds." This bitter controversy culminated in the resignations of Senators Conkling and Platt; but the situation seemed altered a few months later, when, upon the death of Garfield, Arthur succeeded to the presidency. His administration of that office, however, was marked by a realization of its responsibilities, and by principles of procedure different from those which had earlier controlled his actions as a politician.

Those who anticipated the introduction of partisan motives into the executive policy were shown clearly to be in error, and the administration, although not brilliant, was in many respects creditable. The tariff formed the chief object of party legislation, and important congressional action was taken with reference to the problems of polygamy in Utah, of the Chinese, of the development of the navy, and of civil-service reform. On the other hand, the "Star-Route" frauds had not disappeared from notice, and the prevalent dissatisfaction with the methods and accomplishments of the Republican party was typified in the defeat of Arthur's Secretary of the Treasury, Mr. Folger, by Grover Cleveland in the gubernatorial contest in New York. President Arthur was avowedly a candidate for the nomination in 1884, but was defeated by James G. Blaine. He died Nov. 18, 1886. Consult Smalley, *Life of C. A. Arthur* (New York, 1880); and see UNITED STATES, *Administration of Arthur*.

**ARTHUR,** SIR GEORGE (1784–1854). An English colonial governor, born at Plymouth. He entered the army in 1804, served with marked distinction in several campaigns, and in 1814 was appointed Lieutenant-Governor of British Honduras. From 1823 to 1837 he was Lieutenant-Governor of Tasmania, and in the latter year was appointed Lieutenant-Governor of Upper Canada. During part of 1841 he acted as Deputy-Governor. From 1842 to 1846 he was Governor of the Presidency of Bombay, India, in which capacity he carried on the Deccan survey, quelled the Kolapur insurrection, and did much firmly to establish British sovereignty.

**ARTHUR,** JOSEPH CHARLES (1850—). An American botanist. He was born at Lowville, N. Y., studied at the Iowa State College and Johns Hopkins, Harvard, and Bonn universities, served as instructor in the universities of Wisconsin and Minnesota from 1879 to 1882, and from 1884 to 1887 was botanist to the New York Agricultural Experiment Station. He was appointed professor of vegetable physiology and pathology at Purdue University and botanist of the Indiana Experiment Station in 1887. With Dr. Coulter and Dr. Barnes he edited a *Handbook of Plant Dissection* (1886) and (with D. J. McDougal) wrote *Living Plants and their Properties* (1898). In *North American Flora* (1907) the article on *Uredinales* is his. He was one of the editors of the *Botanical Gazette* from 1882 to 1900, and published numerous papers, including *History and Biology of Pear-Blight*.

**ARTHUR,** JULIA (1869—). The stage name of Ida Lewis, an American actress. She was born at Hamilton, Ont., May 3, 1869. At the age of 14 she appeared on the professional stage, and then, after three seasons, went to England to study music and drama. Having returned to New York, she met with success in *The Black Masque*, and in A. M. Palmer's company as Mercedes, etc. In 1895 she appeared in London with Irving at the Lyceum, playing Rosamund in *Becket*, and other parts. Next year she accompanied Irving and Terry to America. In 1897 she brought out in New York *A Lady of Quality* on an elaborate scale; the following season she appeared as Rosalind in *As You Like It*, at Wallack's Theatre. Oct. 24, 1899, she produced, at the Broadway Theatre, *More than Queen*, from the French of Emile Bergerat, taking the part of Josephine Bonaparte, which obtained a great success. In March, 1900, an illness in Philadelphia caused her to leave the stage temporarily. She is the wife of B. P. Cheney, Jr. Consult J. B. Clapp and E. F. Edgett, *Players of the Present* (New York, 1899), and L. C. Strang, *Famous Actresses of the Day in America* (Boston, 1899).

**ARTHUR,** PRINCE, DUKE OF CONNAUGHT. See CONNAUGHT, ARTHUR WILLIAM PATRICK ALBERT, DUKE OF.

**ARTHUR,** TIMOTHY SHAY (1809–85). An American story-writer, born near Newburgh, N. Y. He wrote a great number of moral and domestic tales and sketches which once had much popularity and was one of the authors of a series of histories of various States. One of the most popular of his stories was *Ten Nights in a Bar-Room*, especially as dramatized. He founded *Arthur's Home Magazine* in 1852. He died in Philadelphia.

**ARTHUR,** WILLIAM (1819–1901). A British author and clergyman, born in Ireland. He was in India for three years as a missionary; afterward secretary of Wesleyan Church Missionary Society, and president of the British Conference, and was principal of the Wesleyan College in Belfast from 1868 to 1871. He is the author of *Personal Reminiscences of a Mission to the Mysore* (London, 1847); *The Tongue of Fire, or True Power of Christianity* (1856; 40th ed. in 1885, and many reprints); *The People's Day* (1855; 11th ed., 1856); *Italy in Transition* (1860); *The Pope, the Kings, and the People* (1903).

**ARTHUR'S SEAT.** The hill 822 feet high in the immediate vicinity of Edinburgh, Scotland, supposed to have derived its name from the British King Arthur, who is reputed to have watched from its summit the defeat of the Picts by his army. It is a basaltic mass, analogous to those of the Palisades of the Hudson, though of less extent, which during Mesozoic time flowed out as lava from a fissure in Carboniferous rocks. Erosion through long time subsequent to the period of outflow has resulted in the present form of the hill, which presents on its western and southern sides steep precipices. The hill was selected in 1855 as a base for observations with a view to determining the density of the earth.

**ARTICHOKE** (It. *arciciocco*, dial. *carciocco*,

*carcioffo;* Sp. *alca[r]chofa*, from Ar. *al-harshaf, al-kharshūf*). The true French or globe artichoke, *Cynara scolymus*, is a thistle-like perennial plant of the family Compositæ, now growing wild in the south of Europe, but probably a native of Asia. *Cynara scolymus* has the radical leaves 3 to 4 feet long and somewhat spiny. The stem is 2 or 3 feet high, branched, with large heads of violet-colored (sometimes white) thistle-like flowers at the summits of the branches. The globe artichoke is prized as a vegetable, especially in Europe. Though long known in the United States, it has not become common. It can be found in season in large city markets, fresh and canned, and its use is increasing. The thickened receptacle and fleshy bases of the scales of the involucre of the immature flower is the portion eaten. A favorite method of cooking is to boil in salted water and serve with melted butter or a white sauce. In Europe it is also eaten raw as a salad. Several varieties are in cultivation, differing in the more or less spiny leaves and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about 4 feet apart, and 2 feet apart in the row. The artichoke bed continues productive for several years. Seaweed is an excellent manure. Consult: "Bur or Globe Artichoke," *United States Department of Agriculture Year Book, 1899*; L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900–02); G. Nicholson, *The Illustrated History of Gardening* (London, 1888). The Jerusalem artichoke is a different plant. See ARTICHOKE, JERUSALEM. For illustration, see ARAUCARIA.

**ARTICHOKE, JERUSALEM** (*Helianthus tuberosus*). A tuberous-rooted perennial sunflower, with annual stems 6 to 10 feet high, and closely resembling the common sunflower. The name Jerusalem is a corruption of the Italian *girasole*, sunflower; and the name "artichoke" comes from the supposed similarity of flavor of the tubers to the true globe artichoke. (See preceding article.) The tuber is the edible portion of the plant. The tubers are produced in clusters of 30 to 50, close about the thick, fleshy root. They are irregularly pear-shaped and similar to potatoes in appearance, but not so smooth. There are white, yellow, red, and purple varieties. The plant is propagated, as are potatoes, by means of tubers planted in rows 2½ to 3 feet apart, and 12 to 14 inches distant in the row. It grows on almost any well-drained soil and is oftentimes planted on gravelly knolls or mounds that would be too dry and poor for many other crops. The crop matures in about five months, and the tubers may be left in the ground over winter without harm; but if allowed to freeze out of the ground they spoil rapidly. Yields of 200 to 500 bushels per acre are common, and as high as 1000 or more bushels per acre have been recorded. The tubers of Jerusalem artichokes are frequently grown as a feeding stuff. Though useful for all kinds of stock, they are generally fed to pigs, which are turned in to gather the crop themselves. Like most roots, Jerusalem artichoke tubers are succulent, i.e., have a high water content—some 78 per cent on an average. In composition they resemble potatoes closely. Their principal nutrients are various sugars and inulin, these comprising some 17 per cent. The tubers are somewhat used as human food. A favorite method of cooking them is to boil in salted water until tender and serve with a white sauce. They are also eaten raw, pickled in vinegar. The flavor is mild and distinct. In Europe alcohol has been manufactured from the tubers. The leaves and stalks of the plant have been somewhat used as coarse fodder, especially for cattle. The dry stalks are useful as fuel.

**ARTICLE** (Lat. *articulus*, a little joint). A word which signifies in general a component part of a whole, complete, however, in itself. Thus, we speak of the several articles of a confession: the articles of war; a leading article, etc.

The use of "article" as a grammatical term arose as follows: In such a sentence as, "He found *that* (or *the*) man *that* he was looking for," the Greeks considered the defining particle as connecting the two parts of the sentence and called it joint (Gk. *ἄρθρον, arthron*, Lat. *articulus*); the name was subsequently confined to the first of the two, the other being called the relative. By some grammarians the articles are included among the adjectives.

In English there are two articles—the definite *the*, and the indefinite *a* or *an;* and other modern languages have corresponding words. But articles are not essential to language. The Latin had no articles, and the Greek, as well as the oldest Germanic language, e.g., the Mœso-Gothic, had only the definite article. The Slavic languages have no article, with the exception of the Bulgarian.

The definite articles originate uniformly in demonstrative pronouns. Eng. *the* is only a weakened form of the Anglo-Saxon demonstrative *se*, neut. *thaet* (with the base *the* occurring in all the oblique forms). The same is the case with the Ger. *der;* and Fr. *le*, It. *il* and *lo*, and Sp. *el*, are all from the Lat. *ille*, 'that.' In like manner, *an* or *a* is from the old form of *one* (ān); Ger. *ein* means both *one* and *a;* and so are Fr. *un*, It. and Sp. *uno*, both from Lat. *unus* = *one*.

In the Scandinavian tongues the definite article is attached to the end of the word; the Danish, for example, writes *kong-en*, the king; *hus-et*, the house. It is likewise appended to the noun in the Rumanian, Bulgarian, and Albanian languages.

**ARTICLES, THE SIX.** Articles often mentioned in the ecclesiastical history of England in the sixteenth century, and imposed by act of Parliament in 1539, when, Henry VIII being displeased with some of the bishops most favorable to the Reformation, their opponents for a time regained the ascendency. These articles asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation. Archbishop Cranmer vainly opposed the act in the House of Lords; the King was resolute to have it passed. Its severity was mitigated by a subsequent act of his reign (1544), and it was transgressed with impunity even by ecclesiastical dignitaries, until it was repealed in the first year of Edward VI. The text of The Six Articles Act is given in Gee, *Documents Illustrative of the History of the English Church* (London, 1896).

**ARTICLES, THE THIRTY-NINE.** The articles of religion agreed upon by the archbishops and bishops of both provinces and the whole clergy of the Church of England, in the convocation held at London in the fourth year of Elizabeth, 1562, under Archbishop Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, 42 in number, in the reign of Edward VI. The council appointed by the will of Henry VIII to conduct the government during the King's minority, was for the most part favorably disposed toward the reformed opinions, and the management of Church affairs devolved almost entirely upon Archbishop Cranmer. In the year 1549 an Act of Parliament was passed, empowering the King to appoint a commission of 32 persons to revise the ecclesiastical laws. Under this act a commission of 8 bishops, 8 divines, 8 civilians, and 8 lawyers (among whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, and Justice Hales) was appointed in 1551, and one of its first acts was to draw up a code of articles of faith. These were 42 in number and were set forth by the King's authority in 1553. Strype and Burnet make it appear that these 42 articles were agreed upon in the convocation that was sitting in 1552, but this was not the case. To these articles was prefixed the catechism, and there is no doubt of Cranmer having had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication Edward died, and one of the first acts of the convocation summoned with the Parliament in the first year of Queen Mary was to declare that these 42 articles had not been set forth by the agreement of that house, and that they did not agree thereto. In 1558 Elizabeth succeeded her sister. In 1559 Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed church. Parker applied himself to this work, and, for the purpose, revised the 42 articles of King Edward, rejecting 4 of them entirely, and introducing 4 new ones, viz., the 5th, 12th, 29th, and 30th as they now stand, and altering more or less 17 others.

This draft Parker laid before the convocation which met in 1562, where further alterations were made; and the 39th, 40th, and 42d of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to 39. They were drawn up and ratified in Latin, but when they were printed, as was done both in Latin and English, the 29th was omitted, and so the number was further reduced to 38. From these 38 there was a further omission, viz., of the first half of the 20th article, which declares that "the Church hath power to decree rites and ceremonies, and hath authority in controversies of faith." As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how these omissions arose. However, in 1571, the articles once more underwent revision. Archbishop Parker and Bishop Jewell made a few trifling alterations; and the 29th being restored, the convocation, which was then sitting, ratified them both in Latin and in English, and an Act of Parliament was passed in that year compelling the clergy to subscribe "such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments." There still, however, remained some difficulty as to which was the authorized copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the articles as they now stand. "His Majesty's declaration," which precedes them, and directs that they shall be interpreted "in their literal and grammatical sense," was prefixed by Charles I in 1628.

It may be interesting to know from what other sources the Thirty-nine Articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. And others, such as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII and annotated by the King's own hand. The 11th article, on justification, is ascribed to Cranmer, but the latter part of it existed only in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melanchthon. The fact is that they bear every mark of being a compromise, designed to be agreeable to the contending parties, Lutheran as well as Calvinist, in the Church of England at the time; and it is well to remember that they are not a creed, but a formula intended to test the sufficient loyalty of the clergy and other officeholders. Each party in the Church of England, even to the most advanced high churchmen of the present day, has been able to prove its agreement with the teaching of the articles—to its own satisfaction, at least. Controversy as to the sense in which subscription is made to them was vigorous all through the nineteenth century, the acute dialectic minds of Newman on one side and Jowett on the other having been exercised in proving that they might be signed in a sense other than the *animus imponentis*, or the mind of the authority which requires subscription. It was felt that subscription to a body of doctrinal statements was an excessive obligation, if it were meant to imply literal agreement with every sentence. To avoid further ambiguities, and to relieve clerical consciences on this point, the Clerical Subscription Act of 1866 did away with subscription in the case of the clergy, and substituted a declaration of assent to the articles and Prayer Book. The University Test Act of 1871 released members of Oxford, Cambridge, and Durham universities (except divinity students and holders of offices with clerical functions) from the obligation of signing them, and threw open the doors of these institutions to persons of varying religious beliefs.

They were adopted by the Convocation of the Irish church in 1635, and by the Scottish Episcopal church in 1804. After the organization of the American Episcopal church they were adopted by the General Convention of 1801, with a few slight changes covering references to civil affairs, to the Athanasian Creed, which that body dropped from the Prayer Book, and to the Book of Homilies. That they are not, in their

original form, satisfactory to extreme Protestants is shown by the fact that the Reformed Episcopal church modified a number of them into a more unmistakably anti-Roman sense in 1875, and that Wesley modified and shortened them into 25 for the Methodist Episcopal church in America in 1784. Consult: Browne, *Exposition of the Thirty-nine Articles* (London, 1850); Forbes, *An Explanation of the Thirty-nine Articles* (London, 1867); a comparative text is published in vol. iii and a discussion of its history in vol. i of Schaff, *Creeds of Christendom* (New York, 1884).

**ARTICLES OF ASSO'CIA'TION.** A written instrument, setting forth the purposes, terms, and conditions of the association of several persons for the prosecution of a joint enterprise. It is primarily a contract, binding the parties thereto, severally, to one another for its performance; but it may, when duly executed and filed, have by law the force and effect of a charter of incorporation. Such is the usual mode of incorporating companies under the general corporation laws of the United States. See COMPANY; CORPORATION; INCORPORATION.

In England the term is employed to describe the printed regulations for the conduct of the business of a joint-stock company, organized and registered under the Companies Act of 1862. See JOINT-STOCK COMPANY.

**ARTICLES OF CONFED'ERA'TION.** See UNITED STATES, *History*.

**ARTICLES OF FAITH.** The summarized statements of the views held and taught by a religious body as the essential doctrine of its system. They have been divided, by Protestant writers, into articles that are fundamental and those that are non-fundamental. The best-known articles of faith are the Apostles' Creed; the Nicene Creed, established by the Council of Nice (325 A.D.); the Athanasian Creed; the statements of faith promulgated by the Council of Constantinople (381 A.D.), and by the Council of Ephesus (431 A.D.); the Thirty-nine Articles (see ARTICLES, THE THIRTY-NINE) of the Church of England, drawn up by Cranmer and Ridley, the Augsburg Confession, the Helvetic Confession, the Thirty-seven Articles of the Church of the Netherlands, the Westminster Confession, and the Articles of the Methodist Episcopal Church. No definite articles of faith were drawn up by the primitive Church until the spread of Christianity, the geographical separation of its different branches, and the growth of heresy, made some brief formularies necessary as a basis of union. See CREEDS AND CONFESSIONS.

**ARTICLES OF WAR,** UNITED STATES. The discipline and disciplinary procedure code of the United States army. The articles, or rules, were originally copied from the English Mutiny Act, July 30, 1775, and then enlarged, Sept. 20, 1776. The present articles, which are substantially the same as the former, were enacted April 10, 1806, and form Section 1342, United States Revised Statutes, being printed in full in the United States Army Regulations. They commence by a statement declaring that the armies of the United States shall be governed by these rules and articles; that the word "officer," as used therein, shall be understood to designate commissioned officers; and the word "soldier"—all non-commissioned officers, musicians, artificers, privates, and other enlisted men; and the convictions mentioned therein shall be understood to be convictions by courts-martial. There are 125 articles altogether, to which all commissioned officers must subscribe on appointment. Under these articles expressions or conduct implying disrespect or disobedience toward the President, or those placed in authority, are prohibited: but provision is made for appeal against the decision or conduct of a superior. Mutiny, sedition, quarrels, frays, and other disorders; dueling, and all that pertains to it; drunkenness on duty; sleeping on duty; desertion; and neglect of duty, as well as all other forms of misconduct during war, come under distinct clauses. The sixty-second article, generally called "the general article," provides for the punishment of all crimes not capital and all disorders and neglects not mentioned in the other articles. It is the authority under which statutory and common-law crimes and misdemeanors are punished by military courts. The authority and order of procedure for every description of courts-martial or courts of inquiry is explicitly stated, as well as the law to be observed in the discharge or dismissal of officers; the disposal of the effects of deceased officers or men; and the treatment of spies. Subordination to civil authority is enjoined, attendance at divine service encouraged, and punishment ordered in instances of profanity or abuse. Soldiers are also forbidden to hire other soldiers to perform any of their duties. The concluding article ordains that the articles shall be read and published once in every six months to every garrison, regiment, troop, or company in the services of the United States, and shall be duly observed and obeyed by all officers and soldiers. See MILITARY LAW; COURTS, MILITARY.

**ARTICU'LA'TA** (Lat. nom. neut. pl. of *articulatus*, jointed, from *articulus*, joint), or ARTICULATED ANIMALS. One of the primary divisions of the animal kingdom, according to the system of Cuvier, now divided into several. See ANNULATA: ARTHROPODA.

**ARTIF'ICER** (from Lat. *artifex*, a master in the liberal arts, an artist). A soldier who is a mechanic, blacksmith, farrier, wheelwright, carpenter, harness-maker, or machinist, and who is carried on the rolls as an artificer. In the United States army such a soldier is enlisted as a private and is appointed artificer by the company commander. He receives the pay of a corporal. In England he would be assigned to the ordnance store corps and work at his particular trade. Each regiment has also its corps of pioneers, who are mechanics and receive extra pay for their work. Similar branches are a part of the organization of all other European armies.

**AR'TIFI'CIAL BUT'TER.** See OLEOMARGARINE.

**ARTIFICIAL COT'TON.** See COTTON, ARTIFICIAL.

**ARTIFICIAL FLOW'ERS.** See FLOWERS, ARTIFICIAL.

**ARTIFICIAL HORI'ZON.** A reflecting surface, usually of mercury, used with the sextant (q.v.) or reflecting circle in measuring altitude when the natural horizon is indefinable, and in determining the zero for all instruments by which altitude is measured.

**ARTIFICIAL LIMBS.** The art of replacing lost limbs by artificial ones made of some appropriate material is very old. In the museum of the Royal College of Surgeons, in London, there is an artificial leg of bronze, wood, and iron, exhumed from a tomb at Capua, Italy, in which,

together with the skeleton of the wearer, were found three vases assigned to the year 300 B.C. Herodotus relates the tale of an Elean, captured by the Spartans and confined with one foot in the stocks, who secured his release by amputating his own foot, and who afterward wore a wooden foot. Pliny declares that M. Sergius, about 167 B.C., made and wore an artificial hand, with which he fought in battle. The celebrated artificial hand of the German knight, Götz von Berlichingen (1480–1562), "the Iron-handed," weighed three pounds and was so constructed as to grasp a sword or lance. It was invented by a mechanic of Nuremberg and is preserved at Jaxthausen, near Heilbronn, a duplicate being in the castle at Erbach, in the Odenwald. According to Scott's *Border Antiquities*, the family of Clephane, of Carslogie, "have been in possession from time immemorial of a hand made in the exact representation of that of a man, curiously formed of steel," and that it was given by one of the kings of Scotland to a laird of Carslogie, who had lost a hand in the service of his country. Ambroise Paré described, in 1564, an iron arm constructed for a Huguenot captain, with which he could hold his shield as well as his bridle-rein. Lorrain, a French locksmith, manufactured artificial limbs, under Paré's suggestions, with much success. Father Sebastian, a Carmelite monk, is credited with being the next to construct such limbs, with less success. Verduin, a surgeon of Holland, invented an artificial leg in 1696, which bore his name and which was amended in later years by Serré. It is claimed that, early in the nineteenth century, Baillif, of Berlin, constructed a hand which did not exceed a pound in weight, and in which the fingers, without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat and even a pen. In 1790 and 1810 patents were taken out by Thomas Mann, and in 1800 by James Potts, both of England, for artificial legs of wood. Potts's leg was used by the Marquis of Anglesea (who lost a leg at Waterloo) and was hence called the "Anglesea Leg." In 1818 Von Gräfe invented a mechanical appliance for artificial legs, which is largely used with modifications, by European makers. William Selpho, who worked with Potts in England, introduced the "Anglesea Leg" in America. It was superseded by the "Palmer Leg," a lighter and more adaptable invention by B. F. Palmer, an American cripple. Palmer's leg was patented in 1846, 1849, and 1852. Other American makers have been George W. Yerger, W. C. Stone, J. Russell, O. D. Wilcox, J. S. Drake, and A. A. Marks. Marks was the first to suggest rubber feet and hands, and his artificial limbs are now the most commonly used of any in America. His first patents were issued in 1856 and 1860. In 1845 a Dutch mechanic, Van Peeterssen, invented a hand which could be used by an actor, M. Roger, to pick up a pen or hold a leaf of paper, draw a sword from the scabbard, etc. Van Peeterssen's conceptions were extended and improved by the Messrs. Charrière, the celebrated surgical mechanics of Paris, aided by M. Huguier, the well-known surgeon. A very ingenious arm was also constructed by M. Béchard. The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is best suited for an arm when it gradually tapers to its lowest end, and terminates in a rounded surface. When an arm is removed at the shoulder joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow joint, the best stump is one which includes about two-thirds of the forearm; while a stump formed by amputation at the wrist is very unsatisfactory. The simplest form of artificial arm intended to be attached to a stump terminating above the elbow "consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight" (Heather Bigg). The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated and therefore more expensive pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, and the wrist movements are partially imitated; and a degree of natural softness is given to the hand by a covering of gutta-percha and india-rubber. Artificial rubber hands are now made in America that will write with a pen, manipulate the lever of a locomotive, row with an oar, cancel tickets, hold papers, work telegraphic keys, hold reins in driving, as well as use a pickaxe, carry a heavy weight, etc.

Artificial legs, having fewer requirements to perform than artificial arms, are comparatively simple in structure. A simple and inexpensive artificial leg which answers all ordinary purposes consists of a hollow sheath or bucket, accurately conformed to the shape of the stump, and having a "pin" placed at its lower end to insure connection between it and the ground. Artificial legs are made in America, provided with rubber feet so that the wearer can dance, skate, ride a bicycle, ride a horse, walk in pedestrian contests, climb ladders, and live the usual life of an active laborer or mechanic. There are many men in the service of railroads as conductors, brakemen, switchmen, etc., who wear an artificial leg, and are able completely to perform their duties. In cases of arrested development of the lower limbs, short-legged persons may be made of the ordinary height by the use of artificial feet placed below the true feet, and attached to the legs by means of metallic rods, jointed at the knee and ankle, or by long-topped shoes.

Other parts, not entitled to be called limbs, can also be replaced by mechanical art—such as the nose, lips, ears, palate, cheek, and eye. In the present advanced state of plastic surgery deficiencies of the nose, lips, and palate can usually be remedied by an operation; cases, however, may occur where an artificial organ is required. Artificial ears are molded of silver or of wax, painted the natural color, and fixed in place by a spring over the vertex of the head. Artificial eyes are made which are adapted to fit almost any socket left after enucleation, and which can be detected with difficulty. The color of the iris of the remaining eye is perfectly copied, and blood vessels traversing visible portions are imitated exactly.

**ARTIFICIAL SILK.** See SILK, ARTIFICIAL.

**ARTIFICIAL STONE.** See STONE, ARTIFICIAL.

**ARTIGAS**, ür-tē'gȧs, FERNANDO JOSÉ (1755–1851). A South American soldier and dictator, born at Montevideo. At an early age he became captain of a corps in the Spanish provincial service, in which he continued loyal for some time after the outbreak of the insurrection in Buenos Aires. In 1811, however, as a result of ill-treatment by his superior officers, he joined the Revolutionary forces and won a number of victories. He afterward joined the Republican army besieging the Portuguese troops from Brazil, and then occupying Montevideo, but he acted so independently that the commander-in-chief, Sarratea, outlawed him. He then organized an independent force of *gauchos* (cattle-drivers), defeated the troops sent against him, and forced the Junta at Buenos Aires to give him the whole of Uruguay (1814) and recognize him as an independent chief. He drove the Portuguese out of Montevideo, became dictator, and in 1815 made an unsuccessful effort to take Buenos Aires. Repeated efforts to effect a reconciliation between the parties were rendered futile by personal animosities, and eventually General Artigas was defeated and in 1820 fled to Paraguay; but the Dictator Francia sent him to Candelaria, where he passed the remainder of his life in peace as a political exile.

**ARTILLERY** ("from OF. *artiller*, Sp. *artillero*, It. *artigliero*, OF. *articulier*, explained in a Latin-French glossary as = *artifex*, a master in the liberal arts, an artist; as if from Lat. *articularius*, apparently from *articulum*, dimin. of *ars*, art"). For the development of the meaning, cf. Eng. *engine*, from Lat. *ingenium*, natural capacity, talent, genius.

HISTORY

**Early Artillery Machines.** Before the introduction of gunpowder, the word "artillery" referred to machines for throwing heavy missiles, in which the projecting force was obtained by a spring or weight suddenly released. These included the catapult, bow, crossbow, sling, ballista, onager, springal, etc. The ballista and onager projected their missiles, usually stones, from a bag or bucket, using the spring as a source of energy. The catapult is described as a machine for throwing stones and darts of great size, and the springal as resembling the ballista. There is much confusion attending the description of these old machines, and the various terms are used indiscriminately by different writers. It is reported in some ancient accounts that stones weighing several hundred pounds were thrown over half a mile. The projectiles used included large beams or logs, heavy arrows and stones, and also inflammable material which was projected over the walls of a town, castle, or other fortified place, to set fire to the interior. The machines above mentioned, having little mobility, were restricted almost entirely to use in the attack and defense of fortified places during the progress of a siege. In modern use the word "artillery" is applied, first, to all projectile arms using gas as a propelling force which are supported by carriages (excepting machine guns) in contradistinction to arms which are discharged from the hand or shoulder; second, to the troops serving such arms; third, to the science which treats of the service of the guns and the organization and administration of the personnel.

**Earliest Records.** Cannon made its appearance almost immediately following the discovery of the process of the granulation of gunpowder by the German, Schwartz, in 1320. There is no doubt that gunpowder was known before this date. The English friar, Roger Bacon, who died in 1292, wrote of it, and he is supposed to have obtained his knowledge from the Chinese, who are said to have been acquainted with this explosive for many centuries before that time. There is little doubt, however, that its use as a propelling force dates from the discovery of Schwartz, for shortly following that event artillery began to appear in the different armies of Europe. It is said that Edward III employed *crakeys of war*, by which name artillery was first known, in 1327, in his campaign against the Scots. Froissart (1337–1410) is authority for the statement that at the siege of Quesnoy (1340) the French were repulsed, "their horses being frightened by weapons which made a great noise and shot pieces of iron." This appears to be the most authentic account of the first use of firearms in warfare. Villani, a contemporaneous historian, mentions the appearance of three pieces of cannon at Crecy (1346). The development of this weapon was slow, for, a century later, at the siege of Constantinople, we see the old mechanical engines of war and the new cannon employed side by side. Here appeared the greatest park of artillery yet seen in warfare, gathered for Mohammed by the Hungarian engineer, Urban, who had lately left the service of the Greeks for the more remunerative employment of the Turkish monarch.

Probably the most famous piece of ordnance mentioned in history is the great gun of Mohammed II (1453). It was of brass, weighed 18¾ tons, was 17 feet long, and discharged a stone ball 25 inches in diameter, weighing approximately 600 pounds. No firing carriage was provided, the gun being laid by means of blocks and wedges, and sinking the breech end in the ground. Low charges and high elevations were used, the effect being secured largely from the steep angle of fall of the projectile. Its range according to Gibbon was one mile. A traveling carriage consisting of a train of trucks was provided, and the efforts of 200 men and 60 oxen were employed nearly two months in transporting this great gun about 100 miles. Even larger pieces of this class were to be seen at the Dardanelles only a few years ago.

The artillery of this period consisted generally of huge, cumbersome weapons mounted upon crude carriages (limbers had not yet appeared), which were moved by horses or oxen hitched in tandem, by man power, or sometimes by both. Animals and drivers were employed or impressed as required, and were often dismissed and replaced by others similarly obtained at different points along the line of march. Cannoneers were secured from some neighboring fortress, or maybe hired with the gun, often the personal property of the gun captain. Mobility was of the lowest order. The first employment of the new weapon was in siege warfare, and it was not until the end of the fifteenth century that guns began to be used as field artillery in the sense that we understand the term to-day. The earliest cannon were of the simplest construction, being merely tubes closed at one end, and were fired by means of a hot iron applied to a train of powder passing through the touch-hole to the charge within. These guns were known as "vases" and "bombards," and were bell-shaped rather than cylindrical. They were

supported on rough wooden horses or carrying platforms, the latter sometimes consisting of two wheels in front and a trail attached to the axle. At first the material used was iron bars held together with hoops, sometimes hammered iron or copper, laboriously fashioned by hand; later, guns were cast from bronze and other composition metals.

**First Half of Sixteenth Century—Wars of Charles V** (1521–44). In the wars of Francis I of France and the Emperor Charles V artillery began to establish a reputation as a weapon. The *matériel, personnel,* and draft were still very crude, but guns began to be used effectively on the field of battle. The conical-shaped bombards and vases gradually disappeared during this period and were replaced, in the siege-train, by culverins (18-pounders) drawn by oxen, and in field artillery by cannon (2-, 4-, 6-, and 8-pounders, from the weight of the projectiles thrown) called "falcons," "falconets," and "sakers." It took many years to devise a carriage which would serve both for transportation and for firing. This was gradually developed during the progress of the Franco-Spanish wars. The loss of guns in battle was common because of their immobility. A temporary retirement meant the capture of the guns, and an advance made them useless, as they were then masked by the infantry. The first battle in which artillery played an important part in the general result was at Marignano (1515), where the French had about 350 guns. The Swiss infantry, at that time considered the best in Europe, were unable to stand the fire of this artillery, which covered an important crossing and otherwise distinguished itself by its mobility and timely appearance at critical points. The result was a French victory. At Pavia (1525) the French would have probably won another victory, had their artillery not been masked by their own troops at a critical juncture of the battle.

**Latter Half of Sixteenth Century—Religious Wars of France.** In the religious wars of France the use of artillery was greatly developed and improved both by the Catholics and by the Huguenots. It was a period during which field artillery began to be used in accordance with the principles of tactics, i.e., it was massed or deployed with reference to the other arms of the service, to attain a common end; so that we may consider this an epoch in the general development of battle tactics for field artillery. It was about this time that the numerous kinds and calibres of field artillery were reduced to four (6-, 12-, 24-, and 48-pounders) in the Dutch artillery. This was another important step in the development and improvement of a system of field artillery. During these wars there was a proportion of one gun to about 1000 men of the other arms of the service. Some idea of the ordnance of this period is gained from the table below showing the artillery train sent to Flanders in 1588:

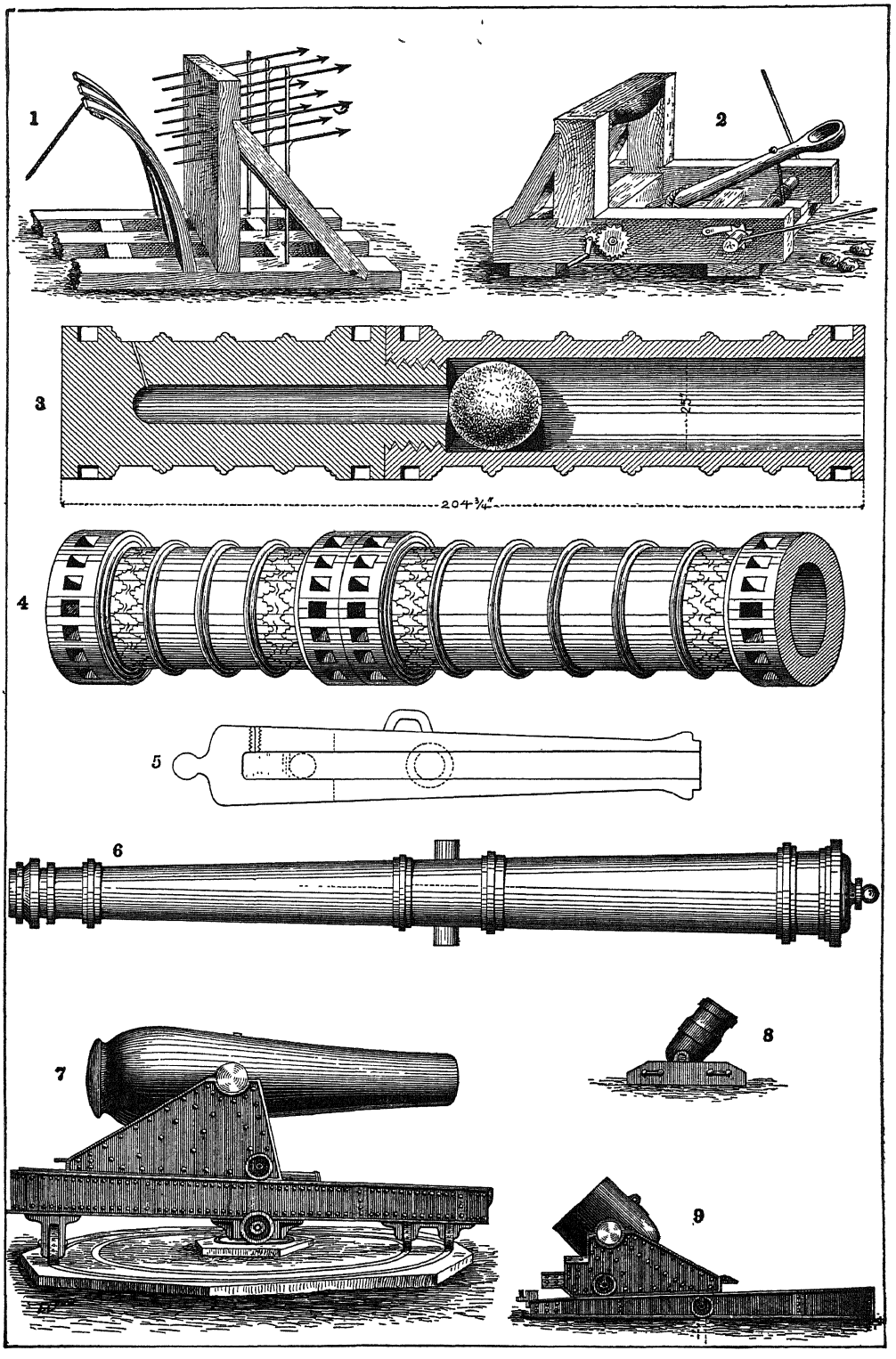
| Classification | Weight* | Diameter of bore | Weight of shot |
|---|---|---|---|
| Demi-cannon . . | 6000 lb. | 6½″ | 30 lb. |
| Culverin . . . . | 4000 " | 5½″ | 18 " |
| Demi-culverin . | 3000 " | 4½″ | 9 " |
| Saker . . . . . | 1500 " | 3½″ | 5 " |
| Minion . . . . | 1100 " | 3¼″ | 4½ " |
| Falcon . . . . | 800 " | 2½″ | 2½ " |

* Exclusive of carriage.

**The Thirty Years' War** (1618–48). It is, however, to Gustavus Adolphus that we owe one of the most important improvements in field artillery, viz., mobility. He soon recognized the defects of artillery in this respect, and that the efficiency of artillery was in exact proportion to its accuracy, rapidity of fire, and quickness of movement on the battlefield. A curious field-piece, sometimes called the "Kalter," sometimes the "leather" gun, consisting essentially of a cylinder of beaten copper, strengthened with iron bands and tangentially supported by coiled rope, the whole being covered with leather, was introduced by him in the Polish War. It was drawn and served by two men only, but of course, had little power. Later it was replaced by iron 4-pounders, drawn by two horses. So many were the improvements made by this remarkable military genius, that his field guns could be fired three times as rapidly as the infantry musket. Gustavus Adolphus considered six field guns to 1000 men of other arms as the most efficient proportion, double that of any other nation of this period. He first introduced the "battalion" system of guns by attaching two to each regiment of infantry and placing them under the orders of the colonel; but he always kept a large number of guns in reserve for critical moments in a battle. He separated the field and garrison artillery, inaugurated the practice of loading the powder in cartridges instead of the old method of using a ladle, and adopted both solid shot and grape for his field guns. It may be said, in passing, that the result of many of the battles of Gustavus Adolphus might have been different but for his improvements in the construction and use of field artillery.

**Latter Part of the Seventeenth Century—The Wars of Louis XIV.** The French artillery was greatly improved during the time of Louis XIV. The material was both bronze and iron; calibres were limited to 4-, 6-, 8-, 12-, 18-, 24-, and 32-pounders; canvas cartridges and grape-shot were employed. Howitzers and mortars came into use, and explosive shells were introduced into the field artillery by the English and Dutch. Louis XIV was the first (1671) to establish a permanent organization for artillery, but it was not until 1732 that rank was conferred upon French artillery officers. The present Royal Regiment of Artillery of the British army was established in 1716. William III (1689–1702) reorganized the *personnel* and formed the first regimental establishment. Formerly men were detailed from other arms for duty with the artillery when needed. Louis XIV also established schools for the instruction of officers in the science of gunnery, introduced platform wagons, wrought-iron field and mortar carriages, and a new and efficient carriage for sea-coast guns. The English artillery at this time was considerably inferior, in mobility, at least. The largest gun used by them during this period was a demi-cannon, weighing about 6000 pounds, exclusive of the carriage. The famous laboratory at Woolwich, England, was established in 1672. In the War of the Spanish Succession the proportion was four guns to every 1000 men of other arms. The guns were used with great effect and skill. The mobility of the artillery increased in all the armies except the English, and it is in this respect that Marlborough differed most radically from Gustavus Adolphus, as the former never attempted to im-

# ARTILLERY—HISTORICAL WEAPONS




1. CATAPULT.
2. BALLISTA.
3-4. GUN OF MAHOMET II
5. NAPOLEON FIELD GUN.
6. CULVERIN.
7. RODMAN 10-INCH GUN.
8. COEHORN MORTAR.
9. CAST IRON 10-INCH MORTAR.

prove the *matériel* which the latter so efficiently used.

**The Eighteenth Century—The Wars of Frederick the Great.** It is remarkable that Frederick the Great should have neglected his artillery as he did in the early battles of his career. It was not until later that its true value as a weapon was learned by him; and, like most military lessons, it was learned by costly experience. The defect of Frederick's artillery was its immobility. The field artillery was divided into batteries of position and battalion guns. The former, consisting of heavy guns, were assembled in large batteries in front of the centre or in the wings; the battalion guns, which were 3- or 4-pounders, were assigned one pair to each battalion, each pair commanded by a corporal. Their instructions were always to precede the battalion by 50 paces, to unlimber at 500 paces, and not to fire grape until within 350 paces. Worst of all, when the battalion was beaten, the loss of the pieces was almost inevitable for want of time to limber up. After the battles of Rossbach, Leuthen, and Hochkirch, Frederick, appreciating at last the valuable service rendered by his artillery during these three important battles, improved and increased the number of guns to five for every 1000 men of other arms. He also created a horse artillery system of 10 light 6-pounders, which was able to accompany his cavalry. His field artillery was also improved as his infantry decreased in number, and consisted of 3-, 6-, and 12-pounder guns and 7-, 10-, and 25-pounder howitzers. The Austrian artillery opposed to Frederick's was much superior. The tactics of this period consisted in massing the guns, but the fire itself was not concentrated, the range of the guns being so inferior that it was impossible to concentrate the fire of separated batteries on the same distant object. The general result of these wars, so far as artillery is concerned, was the formation and organization of position gun batteries, which were assigned to brigades of infantry, thus establishing the brigade system, the formation of howitzer batteries, and the creation of horse artillery.

**Gribeauval Epoch** (commencing 1765). Gribeauval, sometimes called the "father of modern artillery," undertook to reconstruct the French system of artillery in 1765. He separated the arm into the four classes now generally recognized by artillerists—namely, field, siege, garrison, and seacoast, and provided for each a distinct *matériel*. He at once recognized the advantage of decreasing the number of calibres for each kind of service. The guns for field batteries were limited to 3 calibres (4-, 8-, and 12-pounders) and 6-inch howitzers. For siege and garrison artillery he adopted 12- and 16-pounders, 8-inch howitzers, and 10- and 12-inch mortars. By decreasing the length and weight of the pieces, omitting ornamentation and strengthening the carriage, decreasing the windage (clearance between projectile and bore), and the charge, he greatly improved the mobility of the system. Uniformity, lightness, and strength were the ends sought. The introduction of tangent sights and elevating screws greatly increased the accuracy and rapidity of fire. The organization was also improved. Two field guns were assigned to each battalion of infantry, and the men for the service of these pieces were drawn from the company of artillery assigns to each infantry brigade. In addition to this there were eight pieces assigned to the centre and each wing of the army. Eight pieces constituted a "division" to which a company of artillery was assigned. Gribeauval was the first to develop the use of the prolonge, the rope used to unite the trail with the limber, when retiring firing. Horses were hitched in pairs instead of in file. A new ammunition wagon was provided, and canister (a tin case containing a number of balls) was introduced as a projectile. In Gribeauval's system, however, drivers were still hired, as formerly, and the dispersion of the guns among battalions was a serious defect. Horse artillery was established in the French army in 1791 and in the British army in 1793. Gribeauval's improvements in garrison and seacoast carriages resulted in a type, similar in essential principles, to those used in England and America up to the middle of the nineteenth century.

**Beginning of Nineteenth Century—Artillery under Napoleon.** Napoleon created a divisional artillery by withdrawing the guns from the battalions, forming them into batteries, and assigning the batteries to infantry divisions. This added to their efficiency and relieved the infantry battalion of an impediment. He made many important improvements, both in organization (among others reducing the number of guns in the battery from 8 to 6), administration, and the tactical employment of artillery in the field. He reduced the calibres for the field batteries to 6-pounder guns and 24-pounder howitzers, and to 4-pounders for the horse batteries. He used military drivers for horse batteries, and did away with the general custom previous to this advance of hiring teamsters by contract. They now formed a part of the military establishment. Napoleon always held in reserve a large number of guns for use at the decisive moment of the battle, and effectually employed the modern system of concentration of fire from separated masses of guns. His artillery played a most important part at Friedland, Wagram, Borodino, Lützen, and Waterloo. As Napoleon lost his infantry, he increased the number of guns per 1000 men. At Austerlitz the proportion was 2½ guns, at Wagram nearly 4, to each 1000 men of other arms. A study of his campaigns is of the utmost importance, as it gives, perhaps as no other series of campaigns, a detailed account of the possibilities of field artillery.

**British Artillery.** Just before the English wars on the Continent, which began in 1793, the British artillery consisted of a train composed of both field and siege guns, organized in brigades of 12 pieces each. Two guns were assigned to each infantry battalion. Draft was by three horses in single file, the drivers being carters on foot. The necessity for reorganization and improvement was soon made apparent. The driver corps for the guns was established in 1794. The dispersion of the guns among the infantry battalions was abolished in 1802, the guns being formed into field batteries or brigades of 6 guns each. Prior to this time field and siege guns had been gathered, almost haphazard, into batteries of 12 pieces. Shrapnel was invented by Major Shrapnel in 1803, and Congreve rockets by Sir W. Congreve in 1806. Horses were harnessed in pairs. There were 6 horses to each gun and 4 to each caisson. The armament for each battery was 5 guns and 1 howitzer, uniform in each field battery, either 6-, 9-, or 12-pounders. The how-

itzers were 5½-inch brass pieces. At first the horse batteries contained two 9- and three 6-pounders, but later all five guns were 9-pounders. Congreve rockets were unique reversions to earlier artillery weapons, but seem to have been effective. The rocket consisted of a sheet-iron case inclosing the explosive and was fired from a tube. They were first used at Leipzig (1813) and with great success; also in the Peninsular War at the passage of the lower Adour (1814), and at Bladensburg, against American troops. Notwithstanding the above improvements, the British artillery still lacked mobility. Improvement in this direction was steady up to the time of the Crimean War.

**First Half of Nineteenth Century.** In 1822 the corps of drivers in the British Artillery was abolished, and men were enlisted to serve either as drivers or cannoneers. This practice was followed by the French in 1829. The field batteries consisted of 4 guns and 2 howitzers each, the guns being 8- and 12-pounders, and the howitzers 24- and 32-pounders. Weights were reduced, and the ammunition was carried in chests on the limber. Seats were provided for the cannoneers on the limber-chests and the caissons, and the 2 flasks in the trail were replaced by a single "stock." To Napoleon III is due the establishment of a field battery consisting of a single calibre. The gun was known as the 12-pounder Napoleon. The French artillery at this time was divided into horse artillery (the cannoneers being mounted), line artillery, commonly known as "field artillery" (the cannoneers on the chests), and reserve or siege artillery, in which all the men marched on foot. This was the organization at the time of the Crimean War. The British artillery was organized as "position, heavy field, field, horse, and mountain batteries, armed respectively with 18-, 12-, 9-, 6-, and 3-pounder guns, and 8-inch, 32-, 24-, and 12-pounders, and 4-inch howitzers. A rocket section was attached to each battery of field and horse artillery." (See Wagner, *Organization and Tactics.*) The Crimean War consisted principally of siege operations, and there was therefore little opportunity for the tactical use of fieldpieces. At Inkerman (Nov. 5, 1854), however, both sides employed artillery with some effect. The maximum effective range obtained by the guns of this period was only about one mile, and it became evident during the war that the power of the field gun had to be increased and its fire made more accurate if it was to become effective in a contest with infantry. Rifling, though first practically applied in 1846, was not developed until after the Crimean War. Rifled siege guns were first used by the British at the siege of Sebastopol, but with little effect, on account of poor construction. In reference to the question of rifling and breechloaders, Lloyd and Hadcock, in their *Artillery: Its Progress and Present Position*, state that as early as 1547 the principles of rifling and breech-loading had been experimented with in England. A few years after Sebastopol, the Armstrong breech-loading rifled gun, which was first used in the China Campaign of 1860, was introduced into the British artillery.

**Italian War** (1859). Rifled field guns first appeared on the field of battle in the Italian War of 1859, being one of the many improvements made practical by the French. The smooth-bore 12-pounder Napoleon gun and the 4- and 12-pounder rifled muzzle-loader familiar to the Union service during the Civil War, played a prominent part in this war. The Austrian artillery at this time consisted entirely of 6- and 12-pounder guns, and 32-pounder howitzers, all smoothbore. By rifling, the effective range of the French field gun was increased to about 2500 yards. The Austrian smoothbore, with an effective range of only 1450 yards, was therefore at a great disadvantage.

**Civil War in the United States.** *Field Artillery.*—At the beginning of the Civil War in the United States, the field artillery consisted of eight batteries. Most of the seacoast artillery was promptly converted into light batteries. One additional regular regiment and many volunteer batteries were organized. The armament consisted of 3-inch wrought-iron muzzle-loading rifled field guns, 6- and 12-pounder bronze smoothbores, 12-pounder bronze mountain howitzers, and 12-, 24-, and 32-pounder bronze field howitzers. The Napoleon gun was used throughout the Civil War, and with great effect at the shorter ranges. The range of the Ordnance Department 3-inch gun was 2800 yards, and that of the 12-pounder Napoleon about 1500. The objection to the Napoleon, as to all smoothbore arms, was its inaccuracy at long range. The projectiles of this period were shot, shell, grape, and canister. In the Eastern armies the battery contained at first six pieces, later four. There were four batteries to each division. When the divisions were organized into corps, about half of the divisional batteries formed the corps reserve. In 1863 division artillery was abolished, and the batteries of each corps were formed into an "artillery brigade." This system obtained until the close of the war. A brigade contained from 4 to 12 batteries. In the Western armies a battery of artillery was assigned to each infantry brigade, and this organization was retained until 1863. Subsequent changes all tended toward the concentration of batteries. In the Confederate Army of Northern Virginia the artillery was formed into battalions of four batteries each, and a battalion was assigned to each infantry division. To each army corps were assigned two battalions of "corps artillery." This organization of field artillery, with minor changes, has since been adopted by most of the powers. "The War of Secession gave the tactics of artillery a long stride forward. The increased range of the infantry weapon denied to the artillery the ability to manœuvre close to the enemy, as was done in the Napoleonic wars, and greatly restricted the use of grape and canister, which were suitable for short ranges only. The ranges ordinarily employed varied from one-half to one mile, although on occasions batteries sought positions considerably short of these distances. It developed the use of masses of guns to an extent unknown since the days of Napoleon. It infused into the handling of that arm a degree of audacity foreshadowing the tactics of 1870; and if its offensive use in masses had not been all that could be wished, it was due to causes beyond the control of the arm itself." (Wagner, *Organization and Tactics.*)

*Siege and Seacoast Artillery.*—Up to about 1890 the United States had for seacoast defense and siege trains only the guns left over from the Civil War. These were principally Rodman smoothbores and Parrot rifles, both cast iron and muzzle-loaders. They were supplemented in 1872 by the addition of 8-inch

muzzle-loading converted rifles, the old 10-inch Rodmans being utilized for this purpose. The leading position of American artillery in 1861 was largely due to Lieutenant Rodman, of the United States army. His principle consisted essentially in casting guns by cooling from the interior. The system of artillery in the United States at the beginning of the Civil War embraced the following: "Siege and garrison: Cast-iron 4½-inch rifle, 12-, 18-, and 24-pounder guns, 24-pounder and 8-inch howitzers, and 8-inch and 10-inch mortars; Coehorn mortars (bronze). Seacoast: 32-pounder gun, 8-, 10-, and 15-inch Columbiads, 10- and 13-inch mortars. The total embraced seven different calibres of guns, three of Columbiads, four of howitzers, and four of mortars, or 18 altogether—the same as in 1850. In 1861 the smoothbore system of the United States was certainly excellent. In quality of cast-iron used, and its manipulation during manufacture, it has been claimed, and with good reason, that the Ordnance Department of the United States army led all other countries. If not the first upon the ground, the department was among the pioneers in heavy modern armaments, as was shown by the casting, successfully in that year, of what at the time was the most powerful weapon known—a 15-inch Rodman gun, followed, in 1864, by a similar but 20-inch smoothbore, throwing a shot weighing 1080 pounds. This was a grand stride, and placed the American artillery in no secondary position in the array of national armaments at that time developing." (Birkhimer, *Historical Sketch of the Artillery, United States Army.*)

**Austro-Prussian War** (1866). During this war nothing of importance in *matériel*, organization, or tactics, was developed by either the Austrians or Prussians. The field battery of the Prussians consisted of six guns, steel breech-loading rifles and smoothbores in the proportion of 10 to 6. They were called 6- and 4-pounders, the first class using a 15-pound oblong shell, and the latter a similar 9-pound shell. Shell fire, using percussion fuze, was used almost exclusively. Muzzle-loading rifles and smoothbores were used in the proportion of 10 to 6 (8- and 4-pounders), each battery containing eight pieces. The Austrians still retained the system of "brigade" artillery and used rocket batteries. In this war "brigade" artillery and rocket batteries appeared for the last time, and breech-loading rifled field guns first came into general use, although some had been used by the Confederates during the Civil War. The Prussians handled their artillery ineffectively during the entire war, their principal fault being failure to use the batteries at hand. The Austrians were far superior in initiative and dash in the handling of their artillery.

**Franco-German War.** The Prussian artillery officers were bitterly chagrined because of the ineffectiveness of their arm in 1866, and their use of artillery in 1870 was one of the most important military lessons of that war. Reserve artillery disappeared, and divisional and corps artillery alone were employed. To each cavalry division two batteries of horse artillery were attached. The guns employed were steel breech-loading rifles, 6- and 4-pounders. The proportion of artillery was 3.7 guns to 1000 men. The French used muzzle-loading rifles (8- and 4-pounders). A few 12-pounder Napoleon guns seem still to have been in service. The mitrailleuse used by them was a machine gun. Their proportion of artillery was three guns to 1000 men. "The characteristic features of the artillery tactics of the Franco-German War may be summed up as follows: On the march the German artillery was no longer kept in rear of columns of infantry, but was pushed well to the front, being preceded only by enough infantry to protect it from surprise. It was brought into action at the very first opportunity, and almost invariably in large masses, which concentrated their fire upon the objective of the infantry attacks, and the mastery of the hostile artillery was deemed necessary before the infantry advance. Its fire, in almost every case, was deliberate and accurate, and was employed at ranges varying from 3300 to 650 yards, while the French wasted their ammunition in a rapid fire at ranges too long for the best effect. The French committed the further fault of retaining their batteries too long in reserve, and employing them, too often, singly instead of in masses. In this war shrapnel, although first used in 1808, was still in its infancy, and both sides depended mostly upon shell fire. The French time fuze had only two graduations, equivalent to ranges of about 1 and 1½ miles. The Germans used percussion fuzes. The mitrailleuse did not meet the high expectations that had been formed of it, though its effect was sufficient to foreshadow the extensive use of machine guns in future wars. Borbstaedt acknowledges that these guns did produce a considerable effect, partly from the strange, rattling noise they made, partly from the rapidity with which an immense number of projectiles were fired; and he says: 'It cannot be denied that the French mitrailleuses caused heavy losses to the attacking German troops, especially in positions where it was possible to keep them concealed till the decisive moment had arrived.' The mistake of pitting these guns against the German field artillery was frequently and disastrously made by the French. They were good only in the defense of positions." (Wagner, *Organization and Tactics.*)

**Russo-Turkish War.** The guns used by the Russians in this war were inferior to those used by Prussia seven years before. They were bronze breech-loading rifles, the heavy being 9-, and the light, 6-pounders. The *matériel* of the Turkish artillery was superior to that of the Russians, being composed of Krupp's steel breech-loading rifle guns, 8 and 9 centimeters calibre (3.2 and 3.5 inches). The Russians had 3.9 guns to 1000 men, the Turks only 2.2. During this war nothing new was developed either in organization or *matériel.* It was proved, however, in the actions around Plevna that the fire of field guns was ineffective against troops sheltered in intrenchments, and that no previous bombardment, no matter how severe, will justify the artillery in withholding its fire during the advance of the infantry. On this occasion the Russians had furiously bombarded the Turkish trenches preparatory to assaulting with their infantry. When the guns ceased, the Russian infantry advanced to the attack, and was greeted by a murderous fire from the Turkish riflemen who during the bombardment by the Russian guns had remained quiet and unharmed in their intrenchments.

**Spanish-American War.** The artillery played little part in the Spanish-American War of 1898. At Santiago the Americans employed four batteries of 3.2-inch breech-loading rifled

steel field guns. Unfortunately these were supplied with black powder, which immediately drew the fire of the Spanish guns. Major Herbert H. Sargent, in *The Campaign of Santiago*, states that, with the exception of one platoon of mountain guns, the Spanish artillery was composed only of the immobile guns placed for the defense of the city, and most of these were of an obsolete type. The United States organized a siege train composed of 3.6- and 5-inch rifles and 7-inch howitzers, but this equipment was never employed. The 3.2-inch field gun and a 2.95-inch mountain howitzer, purchased in England, were used in the Philippines. One battery of 3.2-inch field guns accompanied the American troops to China in 1900 and was used at Peking.

**Boer War.** In the South African War the British employed a 3-inch breech-loading field gun firing a 15-pound projectile, a horse artillery gun of the same calibre firing a 12½-pound projectile, a 5-inch siege rifle firing 50-pound lyddite shells, several types of howitzers, 2.5-inch mountain guns, and 4.7-inch naval guns. The last mentioned were handled by the naval battalion, and were hauled by horses or oxen, as the occasion required. The fuses of the field and horse artillery guns were graduated up to 3360 and 3960 yards, respectively. According to the comment of the German general staff in their *History of the Boer War*, the shooting and manœuvring of the British artillery were good, but it was not sufficiently trained in fire tactics and working with the infantry. The brigade divisions (battalions) which had not existed in time of peace, were handled with the dash and boldness that had marked the employment of the batteries against savage tribes, and this resulted in the loss of two batteries at Colenso. The Boer equipment consisted of 6-inch Creusot breech-loading siege rifles whose range was 8750 yards, 4.7-inch Krupp howitzers, 3-inch field guns, and 1.45 Vickers-Maxim machine guns (the pom-poms), but much of this armament was old and obsolete. Only in the first part of the war did the Boers employ their artillery by batteries, for after the battle of *Talana Hill* the guns were fought singly, and generally withdrawn before the crisis of the action.

**The Russo-Japanese War** (1904–05). Both sides used artillery to a very large extent, each being armed with modern rapid-fire guns, although not of the latest type, on long recoil carriages. The Russian weapon was superior to that of the Japanese, but the latter were brilliantly successful in the early stages of the war because of the thorough instruction of their *personnel* and the use of "indirect" fire, here employed for the first time in actual war, although originating with the French in their drill regulations of 1897. In this system the guns are concealed as long as possible, the fire being directed by the observer, who is stationed in a commanding position from which he can see the field of fire. Having telephonic or signal communication with the batteries, the observer is a more important man than the gunner. This method was adopted by the Russians later in the war. The artillery prepares for the attack by firing over the heads of the advancing infantry, instead of by the preliminary artillery duel of former days. Mobility is not so important as ballistic qualities, long range, and rapidity of fire. The Japanese field artillery was organized into 19 regiments of 2 battalions of 3 batteries of 6 guns each. One such regiment was attached to each of the 13 infantry divisions composing the army, the remaining 6 regiments forming an artillery reserve which remained at the disposition of the commander-in-chief. In addition, there was the heavy or siege *matériel* manned by the foot-artillery troops. The Japanese gun, although employed according to modern tactics, was not a true rapid-fire gun. It was not equipped with an hydraulic recoil buffer, and this necessitated relaying after each shot. Its calibre was 2.95 inches, and it fired a shrapnel weighing 11 pounds. High explosive shell were also used. The Russian artillery had no regimental formation, but was grouped into battalions of 3 or 4 batteries of 8 guns each. One or two such battalions were assigned to each infantry division (24 to 48 guns). The gun fired a 14½-pound shrapnel (no shell were carried), and was too heavy for the rough Manchurian terrain. Two types were employed, the later and better model being of such recent issue that the troops were entirely unacquainted with its use, and it was not until late in the war that it was handled in such manner as to bring out the real possibilities of the weapon. Prior to that time there had been a tendency to hold a large part of the artillery in reserve, in marked contrast to the Japanese, who early in the action assigned tasks to by far the greater part of their guns. The greatly superior ballistic properties of the Russian gun (it outranged its Japanese rival by 1000 meters or 1093.61 yards) were thus offset by the superior tactics of the Japanese and the presence with the latter of high explosive shell, the lack of which was a great handicap to the Russians. Neither gun was provided with shields, but both sides improvised this protection as the war progressed. Both belligerents used heavy artillery and mortars, but, if we except Port Arthur and the crossing of the Yalu and Tai-tzu, there is little evidence of their effect. Field mortars are described by Colonel Neznamov as without sufficient range and accuracy, and they may therefore be regarded as obsolete. The lessons brought out by this war were the employment of artillery at long ranges and from concealed positions, the danger of exposing the guns during the early stages of the action, the great rapidity of fire and its consequent drain upon the ammunition supply, the negligible effect of artillery fire against earthworks and hidden targets, and, finally, the urgent necessity for coöperation between the artillery and the infantry which it must support with its fire up to the moment of the final assault. For a full account, see RUSSO-JAPANESE WAR.

**Balkan Wars.** In the Balkan wars all reports make mention of the terrible effect of artillery fire. General Herr of the French artillery visited the theatre of operations while the war between Turkey and the Allies was still in progress, and as a result of his investigations concluded that artillery must seek the destruction of the hostile guns, therefore the artillery duel is necessary; that oblique fire so manifested its superiority that every effort should be made to gain positions from which it can be delivered; that a frontal attack is only possible after the mastery of the hostile artillery; that the employment of heavy guns at long range, both for the purpose of hastening the hostile deployment and the destruction of the hostile artillery, is necessary; that excessive ranges are uncertain; that field observatories are abso-

lutely necessary; that mountain batteries are preferable to field artillery as accompanying batteries; that aëroplanes under the control of the artillery are necessary; and finally that drag ropes and man harness should be provided.

The Allies were mostly armed with Schneider-Canet field guns, and their employment was generally similar to the French tactics. The Turks were armed with Krupp guns, but the demoralization which seemed to prevail in the Turkish army militated against their proper use.

The scientific development of coast artillery in which the United States has taken a prominent part, was commenced only during the last years of the nineteenth century. The modern weapons of artillery are now such complicated and complete pieces of mechanism that the various groups can best be considered when treated by themselves, and the reader is referred to the articles COAST ARTILLERY; FIELD ARTILLERY; GUNS, NAVAL; HORSE ARTILLERY; HOWITZERS; MACHINE GUNS; MORTARS; MOUNTAIN ARTILLERY; ORDNANCE; SIEGE GUNS, in which will be found illustrated descriptions of most forms of modern ordnance.

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**ARTILLERY, PARK OF.** A name applied to a collection of guns and accessories in camp or barracks. In action or siege, the guns are parked out of reach of the enemy's fire when not in use themselves. The equipment of a gun park consists of reserve guns and carriages, ammunition wagons and caissons, implements, and material necessary for repairing and completing equipments, and harness stores, field forges, etc. The *personnel* consists of the officers and men of the batteries, smiths, wheelwrights, saddlers, armorers, drivers, and other artificers and laborers.

**ARTILLERY CARRIAGES.** Artillery carriages are of two classes: First, gun carriages, designed so as to enable cannon to be transported thereon or fired therefrom. Of this class those for the seacoast guns are fixed in position. Second, carriages designed for the transportation of ammunition or material necessary for use of the artillery in the field. Artillery carriages and gun mounts will be found discussed at considerable length in ORDNANCE; GUNS, NAVAL. See also ARTILLERY; COAST ARTILLERY; FIELD ARTILLERY; MACHINE GUNS; SIEGE GUNS; HORSE ARTILLERY.

**ARTILLERY COMPANY,** ANCIENT AND HONORABLE, of Boston. The oldest regularly organized military company in America, dating from 1637, and formed on the model of the Honorable Artillery Company of London. In the early days of the Colony it was a purely military organization, composed of the leading citizens of Boston and adjacent towns, and always ready for service. The military organization is still preserved, but the functions of the corps are now more or less social, though regular drills are still held at its armory, in Faneuil Hall.

**ARTILLERY COMPANY,** HONORABLE. The oldest existing volunteer corps in Great Britain, and the model on which the Boston organization of similar name (see ARTILLERY COMPANY, ANCIENT AND HONORABLE) was formed. It had its origin in 1537, in the days of the Tudor sovereigns of England, and is closely rivaled in point of antiquity by the Yeomen of the Guard, the Sergeant-at-Arms, and the corps of Gentlemen Pensioners. The beginnings of the modern artillery school may clearly be seen in the patent forming the company, which, in 1537, Henry VIII granted to three persons, appointing them overseers of the "Science of Artillery" for longbows, crossbows, and hand guns. The city of London has always taken great pride in the organization, which, curiously enough, is the only body of British troops, not regulars, permitted to parade in London streets with bayonets fixed. Until 1849 the members elected their own officers. Since then they have been crown appointments, made on the nomination of the lieutenancy of the city of London.

**ARTILLERY SCHOOLS.** The United States Artillery School, established at Fort Monroe, Va., constitutes an independent command, from which all reports and returns are made to the headquarters of the army. It is governed by special regulations, modified from time to time, as may be necessary. The school consists of a commandant, adjutant, officers detailed as instructors, and of the troops and enlisted men assigned for duty or instruction. The commandant and the heads of the departments, in addition to forming the faculty, constitute a board of coast artillery for the general service, to which questions of professional interest can be submitted. The instructors and the student-officers have no duties other than those of the school. Practically all coast-artillery officers pass through this school. The first artillery school for practice was established at Fort Monroe in 1824, but was discontinued six years later. A second attempt was made in 1858, but was stopped by the Civil War. The school was again started in 1867, but it was temporarily discontinued in 1898, owing to the officers being needed in the field, etc., during the Spanish-American

War. It was reëstablished in 1900, the course being for one year, commencing September 1, and under the plan then adopted was intended chiefly for the recently appointed lieutenants of artillery not graduates of the Military Academy, a considerable number of whom were admitted to the army during and after the Spanish-American War. Instruction is both theoretical and practical, and the course is closed by an examination before a board of officers especially appointed for the purpose. The curriculum includes the subjects of ballistics and seacoast engineering, electricity, mines and mechanisms, artillery, coast defense, and explosives, special courses including customs and usages of service, property returns, correspondence, regulations, etc. A limited number of graduates are retained for the advanced course which occupies the second year. A branch of this same institution is the school for master gunners, under the management of the officer in charge of the artillery school.

A school of fire for field artillery was established at Fort Sill, Okla., in 1911. In this school the course for captains and lieutenants of the regular army lasts three months; for field officers it is one month. There is also a special course of one month for officers of the organized militia. The work consists mostly in the actual fire of field artillery projectiles and a study of the results obtained.

**Foreign Artillery Schools.** France, Germany, England, and Italy have artillery schools, some of which have been established for over 200 years. An artillery school was established in Venice as early as 1515. Louis XIV established a school of application for the artillery at Douai in 1679. This was in 1802 transferred to Metz, where it remained till the war of 1870. It is now at Fontainebleau. The artillery and engineering school of Prussia is at Berlin. The artillery and engineering school of England is at Woolwich. In some of the countries the artillery and engineers' schools are combined, but in most of the European states a separation of the two arms is made. Many countries maintain schools of fire; Germany at Jüterbog, Italy at Natturno, and Austria at Hajmasker.

**ARTILLERY TRAIN.** A certain number of cannon mounted on carriages, with all their furniture, fit for marching. See FIELD ARTILLERY; ARMY ORGANIZATION; ARTILLERY; SIEGE GUNS; TACTICS, MILITARY.

**ART NOUVEAU.** See NEW ART.

**ARTOCARPUS.** See BREAD-FRUIT TREE.

**ART OF POETRY.** See ARS POETICA.

**ARTOIS,** är'twä' (from *Atrebates*, Lat. name of a Gallic tribe). A former province of France, bounded by Flanders and Picardy, almost corresponding to the modern department of Pas-de-Calais. The capital of Artois was Arras. Louis IX, in 1237, made Artois a county, and gave it to his brother Robert, who was succeeded by his son, Robert II, who died in 1302. Afterward it passed into the control of Flanders and Burgundy, but was ceded to France by treaties in 1659 and 1678. It is a fertile district, yielding grain and hops and vegetables, with abundant pasturage.

**ARTOIS,** COMTE D'. The title borne by Charles X (q.v.) before his accession to the throne of France.

**ARTOIS,** JACQUES. See ARTHOIS, JACQUES.

**ARTOT,** är'tō', MARGUERITE-JOSÉPHINE-DÉSIRÉE MONTAGNEY (1835–1907). A Belgian mezzo-soprano. She was born at Paris, July 21, 1835, studied under Pauline Viardot-Garcia, and made her début at Brussels in 1857. The next year she appeared at the Opera House in Paris, but left there to make a tour of France, Belgium, and Holland. Her success was immediate, and after 1860 she appeared in opera in London, St. Petersburg, and the capitals of the Continent, her repertory including parts in operas by Mozart, Rossini, Verdi, Gounod, etc. In 1869 she was married to the Spanish barytone, Padilla.

**ARTOTYPE.** See PHOTOGRAPHY.

**ARTS,** LIBERAL, or SEVEN LIBERAL. The distinction between the liberal arts and the practical arts on the one hand, and philosophy on the other, originates in Greek education and philosophy. In the *Republic* (bk. xi) of Plato and the *Politics* (viii, 1) of Aristotle, the "liberal arts" are those subjects that are suitable for the development of intellectual and moral excellence, as distinguished from those that are merely useful or practical. The distinction was always made, by the Greek theorists, between music, literature in the form of grammar and rhetoric, and the mathematical studies, and that higher aspect of the liberal discipline termed philosophy. Philosophy was sometimes called the liberal art par excellence. Philo of Judæa, in his attempt to harmonize Hebrew religious literature and Greek philosophy by allegorical interpretation, takes this relationship of the arts and philosophy as the meaning of the union of Abraham with Hagar and Sarah—the former typifying the liberal arts, the latter typifying philosophy. No definite number was ever assigned to the liberal arts by the Greeks, though the distinction later indicated by the terms *trivium* and *quadrivium* is clearly made in the *Republic* of Plato. Varro (116–28 B.C.) reproduces the distinction and the substance of the various "liberal arts" for the Romans, though he includes medicine and architecture, both practical subjects, excluded alike by Greek and by Mediæval thought. Quintilian (35–95 A.D.) discusses five arts—grammar, rhetoric, music, geometry, and astronomy; but, with the subdivision of the first and fourth, there would be added dialectic and arithmetic. By the fifth century the number of arts is definitely recognized as seven, both by the churchman Augustine and the pagan Martianus Capella. Cassiodorus, in the sixth century, applies the term *quadrivium* to arithmetic, geometry, music, and astronomy. Probably before that time the term *trivium* had been applied to grammar, rhetoric, and dialectic, to indicate the trinity of the subject rather than simply their elementary character. By the time of Alcuin, in the eighth century, a sacred significance is attached to the number seven, and the Church appropriates this organization of human or pagan learning, to which at first it had been extremely hostile. Throughout the Middle Ages the "seven arts," as combined into the *trivium* and *quadrivium*, represent the sum of human learning. Dante, in his *Il convito* (bk. ii), identifies them with the seven planetary circles of the heavens, discovering in each planet the characteristic excellence of the corresponding study. The "Seven Liberal Arts" formed the curriculum of the early universities, and their mastery entitled one to the degree of *bachelor*, or *master* "in arts." For the greater portion of the Middle Ages philosophy had simply been the inclusive term, but with the development of the universities, it came to be regarded as a higher discipline. The Renais-

sance broke down even this limitation, and hereafter knowledge was no longer confined to these definite and narrow limits. For a survey of the significance of the term "liberal arts," consult: Abelson, *The Seven Liberal Arts* (New York, 1906), containing full bibliography; Parton, *The Arts Course at Mediæval Universities* (Urbana, Ill., 1910). See DEGREE; DIPLOMA; UNIVERSITY; PHILOSOPHY.

**ART STUDENTS' LEAGUE OF NEW YORK.** One of the most prominent schools of art in America, located in New York City. It was founded in 1875 by certain students from the National Academy of Design, who felt the need of study from life and a broader field of work than the more conservative institution could give them; was incorporated in 1878, and has since then risen steadily in importance. The annual membership is now over 1500, and the average daily attendance in its classes is 500. Its alumni include many of the most prominent artists in this country. The quarters of the League is the American Fine Arts Building at 215 West 57th Street. The League is self-supporting, the student's fees being from $30 to $70. It is governed by a board of control elected from the members, who in turn are elected from the advanced students. There are classes in drawing and painting from life, antique drawing, portrait, still life and miniature painting, composition, illustration, modeling, and lectures on anatomy, construction and history of art. There are, in general, no entrance requirements. The school year includes night classes for men and women, and a summer term in the American Fine Arts Building, also a summer school of landscape painting at Woodstock, Ulster Co., N. Y. Besides scholarships to some of the small art schools in other cities, the League gives prizes and scholarships in all of its own classes for the best work done. Among the prizes are the One Hundred Dollar Prize for the best painting, the Saltus Prize of $50 for antique drawing, the Saint-Gaudens Prize of $75 for figure modeling, the Saint-Gaudens Prize of $25 for composition modeling, and the Evans Prize of $50 for the encouragement of the practical side of art.

**ARTSYBASHEV,** MIKHAIL PETROVITCH (1878–1927). A Russian writer of the same school as Gorki and Andréev (qq.v.). He was born in South Russia and claims to have Tatar blood in his veins. He is undoubtedly of mixed descent. The famous Polish humanitarian, Kosciusko, was his maternal great-grandfather. Left a sickly orphan at the age of three, the boy struggled for an education. Painting engaged his attention in his early years, but the indigence of his father deprived him of means enough to master it. Then he turned to writing, and when, years later, a story of his happened to be printed, he determined to become a writer. Subsequent short stories, of which a great number have been published within a few years, showed the wisdom of his determination. At 25 he wrote a novel, *Sanin*, which at once placed him in the front rank of contemporary Russian writers. It took four years, however, to find a publisher for it; but when it was published (in 1907) its success was phenomenal. Favored by the reaction following the hopeful revolutionary days of 1906, this novel created more discussion in Russia than anything else published within a decade. For his frank realism and revolutionary heresies Artsybashev has already (in 1912) served a two months' sentence in a Russian prison. His popularity is very great, however, and he continues writing in the same realistic vein. His method and style are as simple as those of Maupassant, while his psychological analysis is as penetrating as that of Andréev. He treats of present-day Russia in so masterly a manner that his personal leanings are often indeterminable—resembling the great Turgenev in this respect. He writes of all sorts of men with equal frankness and sympathy. Indeed, Artsybashev is to-day the most promising Russian writer. His works, both long and short, have already been translated into German and Yiddish. *Sanin*, so far his only novel, has been dramatized and put on the Jewish stage.

**ARTUSI,** är-tōō'sē, GIOVANNI MARIA (c.1550–1613). An Italian musician, composer, and writer on musical theory. He was born at Bologna, was a canon of San Salvatore, Venice, and stanchly defended the musical traditions and views of his time against the innovations of Monteverde and Gabrieli. He published a *Canzonette*, for four voices, and a *Cantate Domino* (Vincenti collection). His theoretical works include the *L'arte del contrappunto ridotto in tavole* (1586 and 1589), *Delle imperfezioni della musica moderna* (1600 and 1603).

**ARUBA,** ä-rōō'bä, or ORUBA. An island of the Dutch West Indies, situated at the entrance to the Gulf of Venezuela, west of Curaçao, of which it is a dependency (Map: West Indies, E 4). Area, 69 square miles. The population in 1902 was 9105, and estimates in 1911 returned about 10,000. The surface is elevated and scantily watered. Gold is mined, and there are large phosphate deposits. Both of these commodities are important articles of export. Aruba was occupied by the Dutch West India Company in 1634. The capital is Oranjestadt, which contains the bulk of the population.

**ARU,** ä'rōō, or **ARRU,** ä-rōō', **ISLANDS.** A group of islands in the Arafura Sea, situated between lat. 5° 10′ and 6° 20′ S. and long. 134° and 135° E., southwest of New Guinea (Map: Australasia, F 3). It consists of one large island, divided into the five parts of Kola, Wokan, Kobrur, Tragan, and Maikor, and a number of small islands, all of which are generally low and inaccessible. The chief commercial centre is Dobbo, on the island of Womma, and is a resort for traders. The population is estimated at 22,000 and is made up chiefly of Papuans. The group belongs to the Dutch and forms an administrative dependency of the Moluccas.

**ARUM** (Lat. Gk. ἄρον, *aron*, wake-robin, cuckoo-pint). A genus of monocotyledonous plants of the family Araceæ. Most of the species are tropical or semi-tropical. They are characterized by a convolute spathe inclosing the spadix, which is naked at top and bears the pistillate flowers at its base. The staminate flowers are placed just above the base. In some of the species the spathes are highly colored and beautiful. These flowers are well known under the name "callas." The calla or calla lily of the greenhouse and gardens is *Richardia* or *Zantedeschia æthiopica*, a native of Africa. A common species in Europe is *Arum maculatum*, where it is known as cuckoo-pint, wake-robin, etc. In the United States there are a number of closely related genera, of which may be mentioned the Indian turnip (*Arisæma triphyllum*), the water arum (*Calla palustris*), and the skunk cabbage (*Symplocarpus fœtidus*). The

latter is well known for its fetid odor. An allied form, *Anthurium andreanum*, from Colombia, South America, with a large, brilliant, orange-red spathe, is often cultivated. Consult A. L. P. and C. Decandolle, *Monographiæ Phanerogamarum*, vol. ii (Paris, 1878–79). For illustration, see ANEMONE; CALLA.

**ARUNDEL**, ăr'ŭn-dĕl, or colloquially, ärn'dĕl. A small municipal borough of Sussex, England, situated on the navigable river of Arun, about 5 miles from the coast (Map: England, F 6). It has an old parish church, dating from the end of the fourteenth century; but its chief interest centres in Arundel Castle, the former seat of the earls of Arundel, which consists of an old Norman keep and a Gothic building restored late in the nineteenth century. It was besieged twice during the twelfth century and utterly ruined during the civil war of Charles I. It is now the residence of the dukes of Norfolk. Pop., 1891, 2644; 1901, 3059; 1911, 2842.

**ARUNDEL**, THOMAS (1353–1414). Archbishop of Canterbury in the reigns of Richard II, Henry IV, and Henry V. He was born in Arundel Castle, Sussex, the present seat of the dukes of Norfolk, and was the third son of Robert Fitz-Alan, Earl of Arundel and Warren. He became Archdeacon of Taunton (1373) by the Pope's appointment, and Bishop of Ely in August of the same year. In 1388 he was transferred to the archiepiscopal see of York. He was Lord High Chancellor of England from 1386 to 1389 and from 1391 to 1396. In 1396 he was promoted by a papal bull to the archiepiscopal see of Canterbury. Having been banished the kingdom (1397) for taking a leading part in the first attempt which was made to deliver the nation from the oppression of Richard II, he was honorably received at Rome, and at first favored by the Pope, Boniface IX (1389–1404), who later, prejudiced by the representations of Richard II, deprived him of his see and transferred him to St. Andrews in Scotland. He did not return till 1399 and then was reinstated at Canterbury. He crowned Henry IV, October, 1399, and served as his Lord Chancellor for a few days, again in 1407 and 1412. He was conscientiously a bitter persecutor of the Lollards, the followers of Wiclif, and a chief instrument in procuring the horrible act for the burning of heretics (*de heretico comburendo*), passed in the reign of Henry IV (1401). He even carried his bigotry so far as to solicit from the Pope a bull for digging up Wiclif's bones, which, however, was wisely refused him. He also procured a synodal constitution which forbade the translation of the Scriptures into the vulgar tongue. He died at Canterbury, Feb. 19, 1414.

**ARUNDEL**, THOMAS HOWARD, second EARL OF (1586–1646). An English art collector, the first to make any large assemblage of works of art in England. He was born at Finchingfield (Essex), was educated at Westminster School and at Trinity College, Cambridge, in 1616 was appointed a Privy Councilor, and in 1621 Earl Marshal of England. In 1636 he executed an important diplomatic mission at the court of Vienna. See ARUNDEL MARBLES; ARUNDEL SOCIETY.

**ARUNDEL HOUSE.** 1. The famous London house of Lord Arundel, situated where Arundel, Howard, Norfolk, and Surrey streets now unite at the Strand. Here the Arundel marbles were placed when first exported by their new owner from Italy. During the turbulent times of Charles I and Cromwell it was often deserted, and the splendid statuary in its gardens was partially destroyed. 2. The house of Lord Arundel, in which Lord Bacon died in 1626. It stood near Highgate.

**ARUNDEL MAR'BLES.** The inscribed marbles in the collection of ancient sculptures and antiquities formed about 1627 by Thomas Howard, second Earl of Arundel. Of the original collection of 250 pieces, 136 were presented in 1667 to the University of Oxford, by his grandson, Henry Howard, afterward Duke of Norfolk. The collection was formed for the Earl largely through the purchases of Mr. (afterward Sir) William Petty, who traveled in Italy, Greece, and Asia Minor for this purpose. The most important inscription is the "Parian Chronicle," a slab of marble containing a large part of a chronicle of events in Greek (chiefly Athenian) history. It originally extended from the reign of Cecrops, here reckoned as 1582, to 263–262 B.C., the year of its composition, but the Arundel copy breaks off at 355 B.C. In 1897 another fragment, covering the period from 336 to 299 B.C., was found on Paros. The unknown writer not only gives the Athenian archon in whose term the events recorded took place, but also the number of years before 264 B.C. This inscription, with others of the collection, was first published in *Marmora Arundelliana*, by John Selden (1628), later in *Marmora Oxoniensia* by Prideaux (Oxford, 1676), Chandler (Oxford, 1763), and Roberts (Oxford, 1791). The best edition is that of Boeckh, with full Latin commentary, in *Corpus Inscriptionum Græcarum* (Berlin, 1828–77). The new fragment is published in *Mitteilungen des kaiserlich deutschen archaologischen Instituts, Athenische Abteilung*, vol. xxiv (Berlin, 1897). Consult Sandys, *A History of Classical Scholarship*, vol. ii, pp. 342–343 (Cambridge, 1908).

The nobleman whose name is associated with these ancient marbles is worthy of remembrance, independently of his general merits, as the first of his order in England who liberally encouraged the fine arts and communicated the influence of his own taste and enthusiasm in their cultivation to a wide circle of imitators and successors.

**ARUNDEL SOCIETY.** A society founded at London in 1849 and named after the Earl of Arundel, the famous collector of the Arundel Marbles and one of the first great English patrons and lovers of the arts. It was discontinued in 1897.

ARUNDEL CLUB. A society founded at London in 1904 for the purpose of continuing more effectively the work of the Arundel Society. The Arundel Society encouraged the study of art by reproducing the best works of the old masters; but the Arundel Club goes further by copying and publishing important works in private collections previously inaccessible.

**ARUN'DO.** See REED.

**ARUWIMI**, ä'rōō-wē'mē. An important right tributary of the Congo, rising from many sources on the slopes of the Blue Mountains west of Albert Nyanza, East Africa (Map: Belgian Congo, E 2). It flows westward through a densely wooded region to the Congo, forming numerous rapids and receiving the Nepoko from the right. It enters the Congo in lat. 1° 30′ N., after a course of nearly 800 miles. It is navigable to Yambuya. Natives give to parts of

its course the names Ituri, Novelle, Suhali, and Bijerre. Stanley, who discovered the river in 1883, ascended it in 1887 on his expedition in search of Emin Pasha.

**ARVAD**, är'väd. An ancient Phœnician city. The Greek form of the name Ἀράδος, *Arwados*, became Arados when the digamma was dropped; hence the Latinized *Aradus*. Arvad, or more correctly Arwad, was originally the designation of a town on a little island in the Mediterranean about a mile off the coast of Syria, 30 miles north of Tripoli. This island, as well as the small modern village upon it, still bears the name Ruad, or Arwad. But already in the beginning of the fifteenth century B.C. Arvad seems to have had colonies on the mainland. The early Egyptian form of the name, Aratutu or Arudot, corresponding to Arwadoth, is a plural and, as W. Max Müller has suggested, probably designates a city of which the colonies on the mainland were regarded as a part. Thothmes III (1501–1447) conquered the city and after a rebellion punished it severely. It was the home of Abdashirta, and Aziru and his Amoritish dynasty, known to us through the Boghaz Keui tablets, held possession of the city. Tiglath-pileser I (c.1140–1100) embarked in Arvadite ships; Arvad paid tribute to Asurnazirpal III (885–860); Matan Baal of Arvad sent 200 men to the battle of Qarqar against Shalmaneser III in 854; a Matan Baal of Arvad also paid tribute to Tiglath-pileser IV (745–728); Esarhaddon (681–668) demanded tribute of another Matan Baal of Arvad. During the Persian period Arvad formed with Tyre and Sidon a league whose capital was Tripolis. King Strato seems to have held considerable territory in Phœnicia on the advance of Alexander. When attacked by him, the city secured water from springs at the bottom of the sea. The colony Antaradus on the mainland gradually became more important. It is mentioned by Ptolemy. This city was rebuilt by Constantine in 346 A.D. and called Constantina: at the time of the Crusades it had the name Tortosa. The town itself and one of the castles were taken by Saladin, but it returned to the hands of the Christians and was the last possession of the Crusaders in Syria captured from the Templars by Malik al Ashraf in 1291. The walls of Tortosa, now Tartus, are still standing, and there are remains of a castle built by the Crusaders. On the island there are also remains of walls and castles. The latter are of Moslem origin, built since the destruction of the city in 638. The town has now about 3000 inhabitants. Consult: Pietschmann, *Geschichte der Phönizier*, pp. 36 ff. (1889); William Allan, "On the Island of Ruad," in *Journal of the Royal Geographical Society*, vol. xxiii, pp. 154 f. (1853); Renan, *Mission de Phénicie*, pp. 19 ff. (1874); W. Max Müller, *Asien und Europa*, pp. 186 f. (1893); and for Assyriological references, Rogers, *Cuneiform Parallels to the Old Testament* (1912).

**ARVAK**, är'vȧk (early awake). In Norse mythology, one of the horses of the sun. The other was called Alsvid (all-knowing).

**AR'VAL BROTH'ERS** (Lat. *Fratres Arvales*, from *arvum*, a field, arable land). A Roman priesthood of 12 members, whose duty it was to offer public sacrifices to insure the fertility of the fields. The place of their annual meeting was discovered near Rome in 1570, and since then large portions of their records, originally inscribed on slabs inside the temple of Dea Dia, have been recovered, including a list of magistrates from 2 B.C. to 27 A.D. The records end in 241 A.D. and may begin as early as 21 B.C. The college does not seem to have been of importance during the later Republic, but to have been raised to importance by the Emperor Augustus, who was a member, as were his successors, until Gordian III. The members were elected for life by the college, usually on nomination of the Emperor. The officers were a *magister* (master) and a *flamen;* and among the attendants were four boys, who were required to be the sons of senators and to have living parents. Each officer wore a wreath of green, a white fillet, and a white toga bordered with purple. The great annual festival under their charge was in honor of Dea Dia, an otherwise unknown goddess, who must have originally resembled Tellus and Ceres; indeed, W. W. Fowler, in his *Roman Festivals*, p. 74 (London, 1899), identifies her with Ceres. It occupied three days between the middle and end of May and was celebrated with an elaborate ritual. On the first day was the ceremony of "touching" samples of old and young grain; on the second the sacrifice of two white pigs, a cow, and a fat sheep, in a sacred grove beyond the city, followed by blessing or "touching" samples of grain, and after that the dance and song of brotherhood in the temple, and the election of officers for the coming year. On the third day there was a sacrifice in the city. The Arval Brothers celebrated also a festival called Ambarvalia (q.v.). Other important duties of the brothers were to offer sacrifice on the birthday of an emperor, or at the beginning of a consulate, or for escape from danger, or at the starting or ending of a journey, or on occasion of any important event touching the imperial family. On the 3d or 4th of January they recited a particular form of prayer for the ruling Emperor and made sacrifice to the Capitoline deities. Consult Henzen, *Acta Fratrum Arvalium* (Berlin, 1874), and *Ephemeris Epigraphica* (Rome, 1872–99).

**ARVE**, ärv. A tributary of the Rhône, 62 miles long, situated in the department of Haute-Savoie, France (Map: Switzerland, A 2). It rises on the Col-de-Balme (over 7000 feet high), in the canton of Valais, Switzerland, and flows southwest through the Val-des-Bagnes and the celebrated valley of Chamonix, emptying into the Rhône some distance below Geneva through a picturesque gorge at an elevation of over 1100 feet above the sea. The Arve is very swift and turbulent; and, as it is fed by glaciers, it often overflows its banks and is even the chief cause of the rises in the river Rhône itself. At flood, it is superior in volume to the Rhône itself. The district watered by the Arve contains many pleasure resorts and much fine scenery. The chief towns of interest are Servoz, Saint-Gervais-les-Bains, which has sulphur baths, and Sallanches.

**ARVERNE.** A borough in Queens Co., N. Y., comprising the fifth ward of New York City, 3 miles southwest of Far Rockaway on the Long Island Railroad, and on the Atlantic Ocean and Jamaica Bay (Map: New York City, Greater New York, G 8). It is a purely residential borough and is a popular summer resort for New Yorkers because of its accessibility and excellent bathing facilities. Pop. (est.), permanent, 2000; summer, 8000.

**ARVEYRON**, är'vā'rōn'. A tributary of the Arve in the department of Haute-Savoie, France, rising in the Alps, 4400 feet above sea level, as the outlet of the Mer-de-Glace in Chamonix. Other tributaries of the Arve bear the name "Arveyron," and are further distinguished by the addition of the names of the glaciers from which they take their source.

**ARWIDSSON**, är'vēd-son, ADOLF IVAR (1791–1858). A Swedish poet, born at Padasjoki, Finland. In 1817 he was appointed *docent* in history at the University of Åbo; but his outspoken criticism of the acts of the authorities, in an essay contributed to a journal, the *Mnemosyne*, resulted in his banishment from Finland in 1822 and his removal to Stockholm, where he became director of the Royal Library (1843–58). His publications include a collection of poems, *Ungdoms Rimfrost* (1832); a collection of Swedish folk songs, entitled *Svenska Fornsånger* (3 vols., 1834–42); and a translation of the Icelandic *Frithjof's Saga* (2d ed., 1841).

**ARYABHATA**, är'ya-b'hät'ä (end of fifth century A.D.). A Hindu astronomer, born at Pataliputra (mod. Patna, on the upper Ganges). He was known to the Arabs as Arjehir, and his writings had considerable influence on Arabic science. His only work known to us is the *Āryabhatiya*, a series of rules and propositions written in verse and so called after his own name. This was published in Sanskrit, and edited by Kern at Leyden in 1874. It is divided into four parts, entitled respectively, "Celestial Harmonies," "Elements of Calculation," "On Time and its Measures," and "Spheres." Of the second part, Rodet has published a translation (Paris, 1879). Aryabhata held that the earth rotates upon its axis, and he gave the correct explanation of eclipses of the sun and the moon. In mathematics he could solve the quadratic equation, but many of his geometric formulas were incorrect.

**ARYAN**, är'yan *or* är'ĭ-an. The name commonly employed to designate that group of languages and that branch of the human family to which formerly the appellation "Caucasian" or "Japhetic," as opposed to "Semitic," was popularly but inaccurately given. It is synonymous in general with the terms "Indo-Germanic," "Indo-European," or "Indo-Celtic." German philologists commonly employ the term "Indo-Germanic" in its stead, and on good grounds they restrict the name "Aryan" to the sense of "Indo-Iranian," that is, to the Indian and Iranian branches of the great Indo-European family of languages and the early national communities which these languages represent. It can be proved, for example, that in ancient times the inhabitants of India and Persia proudly styled themselves Aryans, and there is no doubt that the term was a national designation in their case. In the oldest hymns of India, the Rig-Veda, Aryan (*ārya*) is employed as a national epithet of the members of the ruling people of northern India, as opposed to the Dasyus, the Gentile or subject races, and especially the darker-skinned inhabitants of the south. The Avesta divides countries into Aryan and non-Aryan (*airya, anairya*), and from *airya* comes the later form of the name *Erān* or *Irān*, and also the classical *Ariana* (see IRANIANS). In the old Persian inscriptions Darius boasts of being "an Aryan and of Aryan descent" (*ariya ariya ciθra*, Naqsh-i Rustam, Inscription a 14).

The etymology of the word *ārya, airya, ariya*, is obscure, and the real meaning of "Aryan" is uncertain. In the older Sanskrit *aryá, ārya* seems to denote 'true,' 'loyal,' and 'good'—in reference, perhaps, to those of the true stock, the real people, the loyal. In later Sanskrit *ārya* means 'noble.' Such explanations as 'plowmen,' 'tillers of the soil' (cf. Lat. *arare*, to plow), taken to denote an agricultural population in contradistinction to a nomadic tribe, have little to recommend them. Moreover, while Aryan, in the sense of Indo-Iranian, is well authenticated in antiquity, little success has followed the attempt to prove that "Aryan" was used in primitive times by the people themselves as a broad and general designation, in the sense in which philologists and anthropologists have employed it. At present the name is given to a family composed of eight great groups of European and Asiatic peoples, whose languages are as follows: (1) Indian and Iranian; (2) Armenian; (3) Greek; (4) Albanian; (5) Italic; (6) Celtic; (7) Germanic; (8) Balto-Slavonic. (See these titles.) A recently discovered Aryan language, Tocharish, has not yet received a definite classification, though it is believed to be more akin to the western groups of the Aryan languages than to the Indo-Iranian. This subject is treated in Sieg and Siegling, "Tocharisch, die Sprache der Indoskythen," in *Sitzungsberichte der Berl. Akad.* (1908). As a linguistic and ethnologic term, "Aryan," both in Europe and in the United States, is beginning to give place to the preferable term "Indo-European" or "Indo-Germanic." "Indo-Celtic," as a designation instead of "Aryan," has not had much vogue; but it is sometimes employed as a substitute for "Indo-Germanic," especially by the French, who use also "Indo-European." As a convenient term, however, for general usage, "Aryan" has much in its favor, and it will doubtless survive as an alternate to the more precise designations.

That the Aryan peoples had their primitive home in the Pamirian region of the Hindu-Kush was formerly the commonly accepted theory; but of late years the evidence is more in favor of the location of their home somewhere between the Caspian and the North Sea, or rather in the steppe land of southern Russia (O. Schrader, 1890, 1901). Brinton (1890) made the Aryans a West European development of the white race (primitively from northern Africa); Keane (1896) placed the Aryan cradle land somewhere in the Eurasian steppe area, while Much (1904) seeks it in northwestern Europe. Others, like Deniker (1900) and Sergi (1895–1901), prefer to speak of the Aryanization of prehistoric dwellers in Europe (from Asia?). The Aryan is a very ancient dweller in both Asia Minor and Central Asia, and the Aryan element in the culture of the south Asiatic peoples is both old and far-reaching. Consult: Schrader, *Reallexikon der indogermanischen Altertumskunde* (Strassburg, 1901), as well as his *Die Indogermanen* (Leipzig, 1911); E. de Michelis, *L'Origine degli Indo-Europei* (Turin, 1903); Taylor, *Origin of the Aryans* (New York, 1890); Reinach, *L'Origine des Aryens* (Paris, 1892); Ripley, *Races of Europe* (New York, 1899); Sergi, *Mediterranean Races* (1901); Much, *Heimat der Indogermanen* (2d ed., Berlin, 1904); Hirt, *Die Indogermanen* (Strassburg, 1905); "Untersuchungen zur indogermanischen Altertumskunde," in *Indogerm.*

*Forsch.*, vol. xxii (1907); Ehrlich, *Zur indogermanischen Sprachgeschichte* (Königsberg, 1910). See INDO-GERMANIC LANGUAGES; INDO-EUROPEANS.

**ARZAMAS**, är'zȧ-mäs'. The capital of the district of the same name, in the government of Nizhni Novgorod, Russia (Map: Russia, F 3). It is situated on the high right bank of the Tesha River at its juncture with the Arsha, an affluent of the Volga, 75 miles by rail from Nizhni Novgorod and 340 miles east of Moscow. Arzamas has tanneries, brickyards, and manufactures iron, flour, soap, and tallow. The town is a commercial centre, trading in cloth and knitted goods. Pop. (latest report), 1897, 10,600. Arzamas was noted in the first half of the nineteenth century for its school of painting, whose products supplied a great part of Russia with holy pictures.

**AS** (Lat.). The designation both of a Roman weight (called also *libra*), corresponding very nearly to an English *pound*, twelve ounces, and of a coin made of the mixed metal *æs*, or bronze. The *as* (coin) originally no doubt weighed a (Roman) pound, but it was gradually reduced to 1–36 of a pound, and even less. It is therefore difficult to assign any fixed value to the *as*. About 270 B.C. the *denarius* (= 17c.) contained 10 asses; so that the value of the *as* was a little less than 1¾ cents. When the denarius was made equivalent to 16 asses instead of 10, the value of the *as* was about 1 cent. It was by the *sestertius* that money was reckoned at Rome. The oldest form of *as* usually bore the figure of an ox, a sheep, or other domestic animal (*pecus*); from which it is usually supposed that the Latin word for money, *pecunia*, is derived. Consult G. F. Hill, *A Handbook of Greek and Roman Coins* (London, 1899). See Plate II of NUMISMATICS.

**A'SA**, son of Abijah (1 Kings xv. 7–9) and the third King of Judah. According to the author of Chronicles he began his reign as a religious reformer by removing the idolatrous altars and breaking the images (2 Chron. xiv. 3). He next turned his attention to the fortifications of the land, building walls and towers (2 Chron. xiv. 6). With an army of 580,000 men he defeated Zerah, the Ethiopian King (2 Chron. xiv. 8–12). On his return from this glorious victory he was met by Azariah, the son of Oded, who preached a new religious reform. Azariah's preaching strengthened Asa in his work, and he removed the traces of idolatry from Judah and Benjamin. He even removed his mother, Maachah, from power because she had made an idol to Ashera (1 Kings xv. 13; 2 Chron. xv. 16). Many scholars question the historical character of this Ethiopian invasion, not mentioned in Kings, and these thoroughgoing religious reforms. For a time Asa had peace in the country, but war broke out between him and Baasha, King of Israel. Against this King Asa asked and secured the help of Bar Hadad, King of Damascus. For this step he was severely rebuked by Hanani, the seer. The King, in anger, imprisoned the prophet (2 Chron. xvi. 7–10). For the last two years of his reign Asa was afflicted with a disease of the foot. He died and was buried in the city of David (1 Kings xv. 23–24) with great solemnity. The duration of his reign may be fixed approximately at 934–877 B.C.

**ASABA**, ȧ-sä'bȧ. A town of southern Nigeria, Africa, situated on the Niger about 150 miles from the coast (Map: Africa, E 4). It was the administrative headquarters of the Royal Niger Company and is the seat of the Supreme Court. In a mineral survey of southern Nigeria important deposits of lignite were discovered near Asaba within a dozen miles of the river. Since 1910 the town has grown rapidly in commercial importance.

**A'SA DUL'CIS** (Neo.-Lat. *asa;* cf. Pers. *azā*, mastic, Ar. *asā*, healing, and Lat. *dulcis*, sweet). A drug in high repute among the ancients as an antispasmodic and diuretic; also for supposed virtues of the most extraordinary kind, such as neutralizing the effects of poison, curing envenomed wounds, restoring sight to the blind, youth to the aged, etc. Its value was estimated by its weight in gold. The princes of Cyrene caused a figure of the plant producing it to be struck on the reverse of their coins, and it was sometimes called *Laser cyrenaicum*. The plant is of the genus *Thapsia* (of the natural order Umbelliferæ). It is a native of the south of Europe and of Barbary.

**AS'AFŒT'IDA**, or **ASSAFŒTIDA** (Lat. fetid asa or assa). A gum resin, which has been supposed to be identical with the exuded juice of the *Silphion* of Dioscorides, so highly esteemed among the Greek physicians; but this, perhaps, was rather the *Asa dulcis* (q.v.). This drug is brought from Persia, Turkestan, and Afghanistan, and is procured by drying the milky juice which flows from the root of the *Ferula fœtida* of the order Umbelliferæ. The root is long, and generally undivided; white inside, but having a black covering; and contains in its interior a quantity of juice of an overpowering odor, which much resembles that of garlic. About April the root leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After a lapse of six weeks a slice is cut horizontally from its summit and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes met with in the market in the form of tears, but more frequently in lumps, which are made up of irregularly shaped tears, agglutinated together by a softer substance. Asafœtida is used in medicine and possesses stimulant, carminative, and antispasmodic properties. It is most useful in minor hysteria, and, from its carminative action, in tympanitis or distension of the intestines with gas. When taken internally, it may be detected in almost every secretion of the body, in the saliva, breath, and urine. It is composed mainly of resin and gum, with oil of garlic and a small amount of ferulaic acid. In many parts of the East asafœtida is employed as a condiment.

**ASAKAWA**, ä'sȧ-kä'wȧ, KWAN-ICHI (1873—). A Japanese-American anthropologist and educator. He was born at Ninonmatsu, Japan, and received his earlier collegiate education at Waseda University in Tokio. He then came to the United States to study at Dartmouth College and at Yale. From the former he received the degree of B.Litt. in 1899 and from the latter, three years later, that of Ph.D. In 1906, after several years as lecturer on the history and civilization of East Asia at Dartmouth College, he went back to Japan to occupy the chair of English at Waseda University. A year later, however, he accepted an appointment as instructor at Yale in the history of Japanese civilization and in 1910

was made assistant professor in this department. Besides numerous articles in Japanese and American periodicals, his published writings include: *The Early Institutional Life of Japan* (1903); *The Russo-Japanese Conflict: Its Causes and Issues* (1904); *Notes on Village Government in Japan after 1600* (1910). He also contributed the concluding chapters to the new edition of *Japan*, edited by Capt. F. Brinkley (1904), and edited "Japan" in the *History of Nations Series* (1907).

**ASAM**, ä'säm. A family of Bavarian artists. —HANS GEORG (c.1649–1711) prepared several oil paintings and frescoes for the churches at Benediktbeuren and Tegernsee. He later gave instruction in architecture at Prague.—His sons, COSMAS DAMIAN (1680–1742), painter, and ÆGIDIUS QUIRINUS (d. c.1746), sculptor and worker in stucco, studied at Rome, and settled at Munich about 1715. They completely remodeled the cathedral of Freising and decorated the monasteries of Maria-Einsiedeln and Metten and the church of St. Emmeram at Ratisbon. They built the so-called Congregational Hall at Ingolstadt, and at their own expense constructed the church of St. John, besides their dwelling in Munich, which building, with its numerous fantastic features, is in some respects one of the most striking specimens of the Baroque style of architecture in Germany.

**ASAMA-YAMA**, ä-sä'mä-yä'mä. The largest active volcano in Japan (8280 feet high), situated in the province of Shinshu, in about 138° 30′ E. long. and 36° 25′ N. lat. (Map: Japan, F 5). The earliest-recorded eruption occurred in 1650. There was a very severe eruption in 1783, which caused the destruction of several villages and of a primeval forest. Since then its activity has been manifested largely in showers of ashes and stones. Its crater is circular in shape and measures about three-fourths of a mile in circumference.

**A'SAPH**. The eponym of a guild of singers in the Second Temple, who may have superintended the musical part of the worship as early as the time of Nehemiah (Neh. vii. 44). Afterward they shared this work with the "Sons of Korah." When the Korahites became porters and doorkeepers, the Asaphites were supplemented by the guilds of Heman and Ethan. The Chronicler, deeming it essential that the musical organizations of the temple should consist of Levites, represents Asaph, Heman, and Ethan as descendants of Gershon, Kohath, and Merari (1 Chron. vi. 33–47). Ps. l., lxxiii.–lxxxiii., are attributed to Asaph and consequently belonged to a hymn book used by this choir.

**AS'APHUS** (Gk. *ἀ, a*, priv. + *σαφής, saphēs*, clear, distinct). An Ordovician genus of smooth trilobites, often of large size, among the members of which there is manifested a tendency to lose that longitudinal lobation which is so peculiarly characteristic of the trilobites as a group. The large head shield has the central portion or glabella indistinctly limited and is provided with two reniform compound eyes, which in some species are placed upon immovable stalks that, rising far above the general surface of the head, enabled the animal to command a view of the entire horizon. This latter arrangement is of interest when considered in connection with the nature of the joint that connected the head with the thorax, this joint having in all trilobites been so constructed as to prevent any lateral motion of the head shield, a slight vertical motion only having been possible. The thorax has eight segments, and the tail shield, of a size somewhat less than that of the head, is generally quite smooth and non-segmented.

The allied genus *Megalaspis* has a head of elongated triangular form, with the anterior and lateral angles produced into sharp spines. Another allied genus, *Niobe*, which appeared at a somewhat earlier age than did *Asaphus*, has the longitudinal lobation quite well marked, and seems to indicate the form of the stock from which *Asaphus* was evolved through a gradual loss of the trilobation and segmentation of the carapace. These three genera, together with four others of less importance and over 150 species, comprise the family Asaphidæ, which is found abundantly in all portions of the Ordovician system in Europe and North America. See ORDOVICIAN; TRILOBITA; and for illustration see Plate accompanying TRILOBITA.

**ASAR**, ä'sär, **OSAR**, ō'sär, or **OESAR**, ē'sär. Variations on the Swedish Åsar. The same as Esker (q.v.).

**AS'ARABAC'CA** (Lat. *asarum*, Gk. *ἄσαρον, asaron*, asarabacca + Lat. *bacca*, berry), *Asarum europæum*. A plant of the family Aristolochiaceæ, a native of Europe, growing in woods; rare, and perhaps not truly indigenous, in Great Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic. The use of asarabacca, however, as an emetic has been much superseded by that of ipecacuanha, which is milder and safer. The powdered roots and leaves enter into the composition of cephalic snuffs, which cause sneezing, and are employed as a counter-irritant in cases of headache, ophthalmia, toothache, etc. The plant contains a volatile oil and a crystalline substance called *asarin*, to which it seems to owe its active properties. The genus *Asarum* is distinguished by 12 pointed stamens, distinct from each other and from the style, and by a bell-shaped three-lobed perianth. *Asarum europæum* has a very short stem, with two shining kidney-shaped leaves on long stalks, from the axil of which springs a single drooping greenish-purple flower. A nearly allied species, *Asarum canadense*, a native of the United States, is stimulant and diaphoretic and is used under the name of Canada snakeroot, instead of *Aristolochia serpentaria*. It is also called wild ginger and used as a spice, being of a warm aromatic quality, and not acrid like its European congener.

**AS'ARUM**. See ASARABACCA.

**ASBEN**, ăs-bĕn. See AIR.

**ASBES'TIC**. A name given to a mixture of second-grade asbestos and serpentine, obtained as a by-product in asbestos mining. The material is crushed and mixed with lime to form a light, strong, fireproof wall plaster, which can be given an excellent finish.

**ASBES'TOLITH** is a somewhat similar material, made from short-fibred asbestos, used for flooring and fireproofing. See ASBESTOS.

**ASBES'TOS** (Gk. *ἄσβεστος*, inextinguishable, incombustible, from *ἀ, a*, negat. + *σβεννύναι, sbennynai*, to extinguish). In mineralogy, antophyllite, amphibole, and serpentine, three minerals of fibrous, crystalline structure, are classified under asbestos. Chemically the two first-mentioned minerals resemble each other; being silicates of lime and magnesia, and alumina; the third being a hydrated silicate of magnesia.

The asbestos of commerce is the fibrous varieties of tremolite, actinolite, and other varieties of amphiboli, of which *chrysotile* is the silky kind. The Italian variety is true asbestos, while most of the output from Canada is chrysotile. *Mountain leather* and *mountain cork* are also varieties of asbestos, amphibole group, which occur as flexible sheets containing little or no alumina and distinguished by their thickness; they cannot be separated into fibre. The mountain cork is elastic, brown in color, and has a specific gravity of .68 to .99. Mountain wood is a variety resembling dried wood, but has no vegetable cells. *Crocidolite*, a beautiful fibrous mineral occurring in south Africa and western Australia, containing 34 to 38 per cent of oxide of iron, has no commercial fire-proofing value, as it disintegrates under heat.

Commercially asbestos has been used since ancient times, and its discovery is attributed to the Romans, who obtained their supply from the Italian Alps and the Urals. The Alps variety was known as *amianthus* (Gk. unpollutable). Amianthus cloth was indestructible by fire, and was used by the ancients to enwrap dead bodies placed on the funeral pile, in order to preserve the ashes of the body. Pliny refers to it as a rare and costly cloth, the funeral dress of kings. Marco Polo in the thirteenth century, while traveling in Siberia, was shown cloth made from fibrous mineral, called amianthus, which withstood the action of fire. Plutarch also refers to his perpetual lampwick made from Carpathian linen. In the Middle Ages it was rarely referred to. In 1720 it was discovered in the Urals, and 40 years later a factory was established for its manufacture. About 1860 interest was revived in Europe, and the first modern attempts were made by a London syndicate to exploit asbestos deposits. Mining operations began about 1878 in Quebec, and a sensation was created in London on the arrival of shipments of the better grades of mineral. The development was very rapid between 1878 and 1890, but was followed by a setback from overproduction and fall in price. This resulted in the introduction of mechanical means for the preparation of the mineral. In 1909 15 quarries were operating over an area 20 miles in length, and 19 mills having a daily capacity of 8520 tons. In 1911 Canada produced 85 per cent of the world's output, Russia 10 per cent, the United States 3 per cent, and Africa and other countries 2 per cent. Deposits are reported in several of the States, but little prospecting has been done. The output from the United States in 1912 came from Georgia, Vermont, and Wyoming. Deposits are known as cross fibre, slip fibre, or mass fibre, according as the fibre crosses the vein or is parallel to it. Veins vary from a mere thread in width up to from 4 to 6 inches and are very irregular; the width is no criterion of the length of the fibre. Development in Quebec has reached 400 feet, where the quality is found to be the same as on the surface. The commercial requirements are length, fineness of fibre, infusibility, tensile strength, and flexibility. Temperatures of from 2000° to 3000° F. are easily withstood, while some varieties will withstand 5000° F.

Up to 1898 the dressing of asbestos rock was entirely by hand. Overproduction, resulting in a reduction in price, necessitated the introduction of mechanical means for cheaper production and a much wider market. The first mill in Canada was erected in 1889, followed quickly by many new mills of improved type. The general milling practice to-day consists of hand sorting in the quarry, sending the better grades to cobbling houses, the waste rock to the dump, and the mill rock together with the fines to the mill. In the mill the rock goes to breakers, dryers, rotary crushers, fiberizers, and screens. The fibre is separated by fans. The mill rock from a quarry amounts to from 20 to 80 per cent of the output and the fibre from 6 to 12 per cent of the mill rock. The value of the product varies from $10 to $300 per ton.

The use of asbestos has increased and is increasing very rapidly. It is employed in the manufacture of woven fabrics, such as fireproof theatre curtains, cloth for theatre wall linings and scenery, firemen's clothing, and fireproof rope; roof shingles or asbestos slate, stucco plaster, lumber, mill board, asbestos paper, and insulating; coverings for pipes, furnaces, and locomotives to prevent radiation of heat; and as a filler for high-grade paints. Consult: Jones, *Asbestos: Its Properties and Uses* (London, 1890); "Asbestos" in *Mineral Industry*, vol. vi (New York, 1897); Fritz Cirkle, *Chrysotile—Asbestos, Occurrence, Exploitation, Milling and Uses*, Canadian Department of Mines (Ottawa, 1905); U. S. Geological Survey, *The Production of Asbestos* (1912). See AMPHIBOLE; SERPENTINE; ASBESTIC.

**ASBESTOS.** A village of Richmond Co. in the province of Quebec, Canada, 85 miles southwest of the city of Quebec, and 4 miles east of Danville (Map: Quebec, G 5). It is situated on the Danville and Atlantic and Grand Trunk railways. The town contains mills and factories, but the rich deposits of asbestos in Richmond and the adjacent counties of Wolfe and Megantic are the chief sources of its prosperity. Pop., 1901, 783; 1911, 2224.

**ASBJÖRNSEN,** ȧs-byĕrn'sen, PETER CHRISTEN (1812–85). A distinguished Norwegian student of folklore and zoölogy, born at Christiania. He studied at Christiania University and taught for several years. He made long journeys on foot for scientific purposes, in the course of which he collected popular tales and legends, which, in coöperation with his friend Jörgen Moe, the future Bishop of Christiansand (1838), he published, and later several times supplemented, as *Norske Folkeeventyr* (*Norwegian Folk Tales*, 1842–43). *A New Collection* appeared in 1871. It was followed by another, *Norske Huldre-eventyr og Folkesagn* (*Norwegian Fairy Tales and Folk Legends*, 1845–48). His scientific researches earned him traveling stipends at intervals from 1846 to 1853. He then studied forestry and held various official positions in connection with the forest and turf industries from 1860 to 1876, when he was pensioned. He made several important discoveries in deep-sea soundings and wrote on zoölogy and other scientific subjects; but this side of his work is quite overshadowed by work in folklore, which shows literary talent and much originality. He did not, like the Grimms and Arnason, aim merely at reproduction, but retold the stories in settings that illustrated the life and mental horizon of the people, with exquisite bits of natural description that found immediate and wide recognition. Many of Asbjörnsen's tales have been translated into English: *Popular Tales from the Norse*, tr. by Sir George

Dasent (London, 1859); *Tales from the Fjeld*, by the same (ib., 1874); *Fairy Tales from the Far North*, tr. by Braekstad (New York, 1897).

**ASBOTH**, ŏsh'bōt, SÁNDOR (ALEXANDER) (1811–68). A Hungarian-American soldier. After fighting under Kossuth (1848–49), he accompanied him to America in 1851 and became a citizen of the United States. During the Civil War he commanded divisions under Frémont and Curtis, as brigadier-general and was seriously wounded at the battles of Pea Ridge (March 7–8, 1862) and Marianna (Sept. 27, 1864). He resigned with the brevet rank of major-general (August, 1865), and was United States Minister to the Argentine Republic (1866–68), where he died of his wounds.

**ASBURY**, ăz'bĕr-ĭ, FRANCIS (1745–1816). The first bishop of the Methodist Episcopal church ordained in the United States. He was born at Hamstead Bridge, 4 miles northwest of Birmingham, Eng., Aug. 20 or 21, 1745. He obtained rudimentary education in a village school; at 18 became a local preacher; at 21 was received by Wesley into the itinerant ministry; and on Oct. 27, 1771, landed in Philadelphia as a missionary in America. It was but three years after the building of the first Methodist church in the country, and the conference of that year gave but 316 Methodists in America, chiefly in Philadelphia and New York. When the Revolution began, Asbury sympathized with the people, and while Mr. Rankin, who was the ecclesiastical superior, returned to England, Asbury remained; though, like many other non-jurors, he was subjected to suspicion and at one time to imprisonment. After about two years of surveillance the authorities concluded that the scruples of Asbury were not political, but religious, and he was permitted to go free. He improved his opportunity, and when the war closed there were 83 Methodist ministers at work, and the membership reached 14,000. In 1784 the several societies were organized into an Episcopal church, and Asbury and Thomas Coke were elected, by the conference in Baltimore, Md., 1784, joint superintendents. The title "bishop" was substituted later, which called out a rebuke from Wesley, who, however, approved of Asbury's superintendence. Thenceforward his life was devoted to preaching and the supervision and extension of churches. His labors were incessant, and his biography is itself a good history of the growth of Methodism in America. He never married, lest a wife should distract attention from his great work. He was always poor and always generous. In 1785 he laid the foundation for the first Methodist college, and afterward formed an educational plan for the whole country, by making districts with at least one classical academy in each. He was rather stout, of medium height, with a fresh countenance and a penetrating eye. Wesley alone was his superior as a practical worker and organizer, and the two were alike in zeal and spirit. During his ministry it is estimated that Asbury traveled more than 270,000 miles, visiting every part of the country; preached more than 16,000 sermons; ordained over 4000 ministers, and presided at 224 conferences. It is largely due to the labors of this indefatigable apostle that Methodism in America owes its excellent organization and wonderful growth. He died at Spottsylvania, Va., March 31, 1816. His only written works were his journals (New York, 1852), which are personally and historically of great value. For his biography, consult W. P. Strickland (New York, 1858), and Smith (Nashville, 1896); Du Bose, *Francis Asbury* (Nashville, Tenn., 1909); Mains, *Francis Asbury* (New York, 1909). Consult also Tipple, *Heart of Asbury's Journal* (New York, 1904).

**ASBURY PARK.** A city in Monmouth Co., N. J., 51 miles, by rail, south of New York City, on the Atlantic Ocean, and on the Central of New Jersey and the Pennsylvania railroads (Map: New Jersey, D 3). Asbury Park is one of the most popular watering places on the Atlantic coast. A board walk extends for almost two miles along a fine beach which is owned by the taxpayers. The city contains a large number of good hotels and cottages, a public library, several theatres, lecture halls and pavilions, parks, hospitals and dispensaries, and an aviation field. Among the notable events of the summer season are the big Baby Parade, at which $4000 is awarded in prizes, the lake carnival, the masque fête, and the fireworks displays. At Ocean Grove, which is separated from Asbury Park by Wesley Lake, is one of the largest musical auditoriums in the country, having a seating capacity of almost 10,000. The city has manufactories of sleeping garments and automobiles.

Asbury Park was founded in 1869, incorporated in 1874, and chartered as a city in 1897. The beach front, the water works, and sewage system are owned by the municipality. Pop., 1900, 4148; 1910, 10,150; 1920, 12,400. The summer population is estimated at about 100,000.

**ASCAGNE**, ăs'kăn'y'. A character in Molière's comedy, *Le dépit amoureux*, who is substituted for her dead brother of the same name and habited in his garments, but who later falls in love with Valère and marries him secretly.

**AS'CALON.** A city of Palestine. See ASHKELON.

**ASCALON.** The sword of St. George, mentioned in Richard Johnston's *Seven Champions of Christendom*, a romance printed in 1596.

**ASCA'NIUS**, called also Iulus, the son of Æneas, and mythical founder of the family of the Cæsars. He founded also the city of Lavinium. It is in the disguise of Ascanius that Cupid, in Vergil's *Æneid*, implants the flame of love for Æneas in Dido's breast.

**AS'CAPART.** The name of a giant, 30 feet high, often referred to by Elizabethan writers. He appears in the romance *Bevis of Hampton*, where he is conquered by the hero.

**AS'CARIS** (Gk. *ἀσκαρίς, askaris*, a worm in the intestines). A genus of intestinal nematode or round worms, which are of comparatively large size. The body is long and cylindrical, and the mouth is usually surrounded with three lips or cephalic valves, one in a dorsal position and the other two ventral. Species of *Ascaris* are found parasitic in man, pigs, sheep, calves, horses, dogs, cats, etc. In addition to their irritation of the intestinal mucosa, narrowing or stoppage of the intestinal lumen, and possibly rupture, they excrete toxins which may cause nervous disturbances and inflammatory changes. These worms are not attached by means of hooks or otherwise to the walls of the intestines, and may be expelled by the administration of cathartics and vermifuges. The best-known species is the round-worm of man, the pin-worm being placed in a closely allied genus. Another species (*Ascaris megalo-*

*cephala*), larger than the preceding, is found in the intestine of the horse. It is sometimes as large around as a lead pencil, and has a noticeably large head. It is of special interest to biologists, because it was upon the eggs of this species that the German scientist Boveri made his notable observations regarding cell division and the behavior of the chromosomes.

**ASCEND'ANT** (Lat. *ad*, to + *scandere*, to climb). In astrology, the easternmost or rising star in a horoscope is in the ascendant, or "house of life." It was deemed to have the most influence on destiny, or to give the strongest indication of the future; so it is said when one's prospects improve, "his star is in the ascendant."

**ASCEN'SION** (for origin of name, see below). An isolated volcanic island in the Atlantic, in lat. 7° 55′ S., and long. 14° 23′ W., about 700 miles northwest of St. Helena (Map: Africa, C 5). It has an area of 34 square miles, little of which is under cultivation, and rises to an elevation of 2870 feet in Green Mountain, on which a sanitarium for sailors has been erected. The island, which belongs to Great Britain, is fortified, is under the direct control of the Admiralty, and is used as a coaling and supply station for the British navy. The population in 1912 was estimated to be about 200. It consists principally of officers and their families, seamen, and a few natives. Vegetables and fruit are grown, and small game is abundant. The island was discovered by the Portuguese in 1501 and named Conception Island. It was revisited on Ascension Day, 1508, when it received its present name. It was settled by the British in 1815, during Napoleon's stay on St. Helena. Principal settlement, Georgetown.

**ASCENSION,** RIGHT (Lat. *ascensio*, an arising; Ger. *gerade Aufsteigung*). The name given in astronomy to one of the two factors which determine the position of a heavenly body in the sky with reference to the celestial equator, the other being the declination. Right ascension and declination are quite analogous to longitude and latitude on the earth. The initial point for measuring right ascension is one of the points of the celestial equator where it is intersected by the ecliptic, and this point is called the vernal equinox, or the first point of Aries. The right ascension of a heavenly body is then defined as the angular distance measured on the celestial equator from the vernal equinox to the foot of a perpendicular circle let fall on the equator from the heavenly body. The right ascension is ascertained by means of the transit instrument and clock. The transit instrument enables us to observe its meridian passage, and the transit clock gives the time at which this takes place. This clock is set so that when the first point of Aries is in the meridian it stands at 0 hours, 0 minutes, and 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock at the passage of any heavenly body then enables us to calculate that body's right ascension. The right ascensions of all the fixed stars down to about the ninth magnitude have been thus determined and are published in printed star catalogues. With the completion of the International Star Catalogue now in progress, the right ascensions of all stars down to the eleventh magnitude, to the number of about 2,000,000, will become available.

**ASCENSION DAY,** or HOLY THURSDAY. One of the great religious festivals of the Episcopal and also of the Roman Catholic church. It is held on the fortieth day after Easter, and is intended to commemorate the ascension of Christ into heaven. It is one of the six days occurring in the year for which the Church of England appoints special psalms, and the same church also particularly recommends it as a fitting day for the receiving of communion. No mention of its celebration occurs before the fourth century, though St. Augustine believed it to have been instituted either by the apostles themselves, or the primitive bishops succeeding them. Connected with its religious observances were certain civic ones, which in some parts of England and Scotland are still continued, viz., *beating the bounds*, or *riding the marches*, though their religious connection is apparently forgotten. See ROGATION DAYS; PERAMBULATION OF PARISHES.

**ASCETICISM.** Among the Greeks, ἄσκησις, *askēsis*, denoted the exercise and discipline practiced by the athletes or wrestlers, who had to harden their bodies by exertion, and to avoid all sensual and effeminating indulgences. In the schools of the philosophers, especially of the Stoics, the same word signified the practice of mastering the desires and passions, or of severe virtue. In these senses it passed into the language of the early Christians. The essence of asceticism is to hold self-denial and suffering to be meritorious in the sight of God, as a means to perfect the moral nature and to rise to spiritual heights not otherwise attainable. Aside from asceticism for training, which the meaning of the word suggests, there is an asceticism which rests upon a dualistic philosophy. It holds that the material world is evil; redemption of the soul is found only by withdrawing from the world. Though complete separation from matter can take place only at death, yet the soul may, by asceticism, proclaim independence of the material world and so work toward its redemption. This dualistic asceticism is Oriental (Indian) in origin, but before the beginning of the Christian era had penetrated into the Greek world. Asceticism in the Christian Church is derived from both types. Judaism was not originally ascetic, but regarded the world as the good gift of God, to be used and enjoyed to his glory. Protestantism has in general taken the same attitude. Even in the Greek and Roman churches asceticism has been much modified in modern times. The reasons for asceticism have largely vanished in the belief that evil and good reside, not in matter, but in the moral life; and that normal living furnishes a sufficient training for spiritual life. Consult Hastings, *Encyclopædia of Religion and Ethics*, "Asceticism," and Moore, *Greek and Roman Ascetic Tendencies* (Boston, 1912). See MONASTICISM.

**ASCH,** ăsh. A town of the Austrian crownland of Bohemia. It is situated at the foot of the Hainberg, about 2100 feet above the sea level, 13 miles northwest of Eger, and near the Bavarian and Saxon frontiers (Map: Austria, C 1). It manufactures woolen and mixed silk and woolen goods, particularly stockings, and there are machine shops and bleaching and dyeing establishments. Pop., 1890, 15,557; 1900, 18,700; 1910, 21,583.

**ASCHAFFENBURG,** ä-shäf'*e*n-bŭrk. The capital of the Bavarian district of lower Franconia, on the right bank of the Main, at its

junction with the Aschaff (lat. 50° 1′ N., long. 9° 7′ E.), about 23 miles east-southeast of Frankfort (Map: German Empire, C 4). It is built upon an eminence and has a healthful and attractive situation. Among its buildings is the castle of Johannisburg, built between 1605 and 1614 by Johann Schweikard, of Kronberg, Elector of Mainz, containing a collection of paintings and engravings and a fine library. Besides a cathedral, military barracks, and town hospitals, Aschaffenburg possesses a Roman villa, built by King Louis I, in imitation of the Castor and Pollux edifice discovered at Pompeii. Among its educational and charitable institutions are a gymnasium, a *real-schule*, two seminaries, a music school, and two orphan asylums. It is the burial place of the poets W. Heinse and K. Brentano. The town manufactures clothing, varnishes, glue, cigars, beer, and colored papers, for the latter of which it has long been famous. It carries on a considerable trade in cattle, wood, building stone, tobacco, wine, etc. Pop., 1890, 13,275; 1900, 18,091; 1910, 29,892. Aschaffenburg existed as early as the invasion of Germany by the Romans, who built a castle here. In 974 it came into the possession of the archbishops of Mainz and remained with them until the dissolution of the Germanic Empire. The Concordat between the Pope and the German nation was prepared at Aschaffenburg in 1447. In 1814, along with the principality of which it is the capital, it was ceded to Bavaria by Austria.

**ASCHAM,** ăs'kam, ROGER (1515–68). A distinguished English writer, humanist, and classical scholar, born at Kirby Wiske, in Yorkshire. He received his early education at home under the direction of his father and in the family of Sir Anthony Wingfield, and in 1530 entered St. John's College, Cambridge, where he took his degree of M.A. in 1537. The study of the classics, especially Greek, had recently been revived at Cambridge, and Ascham's bent impelled him with ardor to these studies. His reputation as a classical scholar soon brought him numerous pupils, and, there being at that time no Greek chair, he was appointed by the university to read Greek lectures. At first he opposed the newly introduced (Erasmian) method of pronunciation, which is still used in England, but afterward adopted and defended it. His leisure was devoted to music, penmanship, in which he excelled, and archery. In defense of the latter art he published, in 1545, a treatise, entitled *Toxophilus,* the pure English style of which, independently of its other merits, ranks it among the classical pieces of English literature. For this treatise, which was dedicated to Henry VIII, he was rewarded with an annual pension of £10, equivalent to about $500 of our present money. In 1546 he was appointed university orator; and in 1548, on the death of his former pupil, Grindal, he was called to supply his place as master of languages to the Princess (afterward Queen) Elizabeth. In this office he gave the highest satisfaction, but at the end of two years abruptly resigned it because of a quarrel with the steward of the household. That he did not lose favor at court, however, is manifest from his having soon after been appointed secretary to serve Richard Morysin, Ambassador to the court of Charles V. He spent three years in Germany and in Italy, and on his return published the diary he had kept during his travels. The interest of Gardiner, Bishop of Winchester, secured his appointment as Latin secretary to Queen Mary; his pension also was doubled. His prudence and moderation preserved him from offending by his Protestantism. After the death of Mary, Queen Elizabeth retained him at court as secretary and tutor, posts which he held until his death, in 1568. His second important work, *The Scholemaster,* a treatise on classical education, was published in 1570 by his widow. An English version of Ascham's letters appeared in 1777, ed. by Kennedy, with a *Life* by Dr. Samuel Johnson (reprint, 1815). Consult: *The Collected Works of Ascham,* ed. J. A. Giles (London, 1864–65); *Toxophilus,* ed. Arber (ib., 1868, and reprinted, 1902); *The Scholemaster,* ed. Mayor (ib., 1863), and the reprint by Arber (1878); Katterfeld, *Roger Ascham, sein Leben und seine Werke* (Strassburg, 1880); English Works, ed. Wright (New York, 1905).

**ASCHBACH,** äsh'bäG, JOSEPH (1801–82). A German historian, born at Höchst, near Frankfort-on-the-Main. He held the professorship of history at Bonn (1842–53) and at the University of Vienna (1853–72). In 1870 he was ennobled. Among his works are *Geschichte der Westgothen* (1827); *Geschichte der Omajjaden in Spanien* (2 vols., 1829–30); *Geschichte Kaiser Sigismunds* (4 vols., 1838–45); *Geschichte der Wiener Universitat* (1865); and *Roswitha und Konrad Celtes* (1867), in which he maintained that the panegyric of the Emperor Otho the Great, which was ascribed to the nun Roswitha, had been written by Konrad Celtes during the sixteenth century. This assertion was disproved by Waitz and by Köpke. Consult R. Köpke, *Ottonische Studien* (1869).

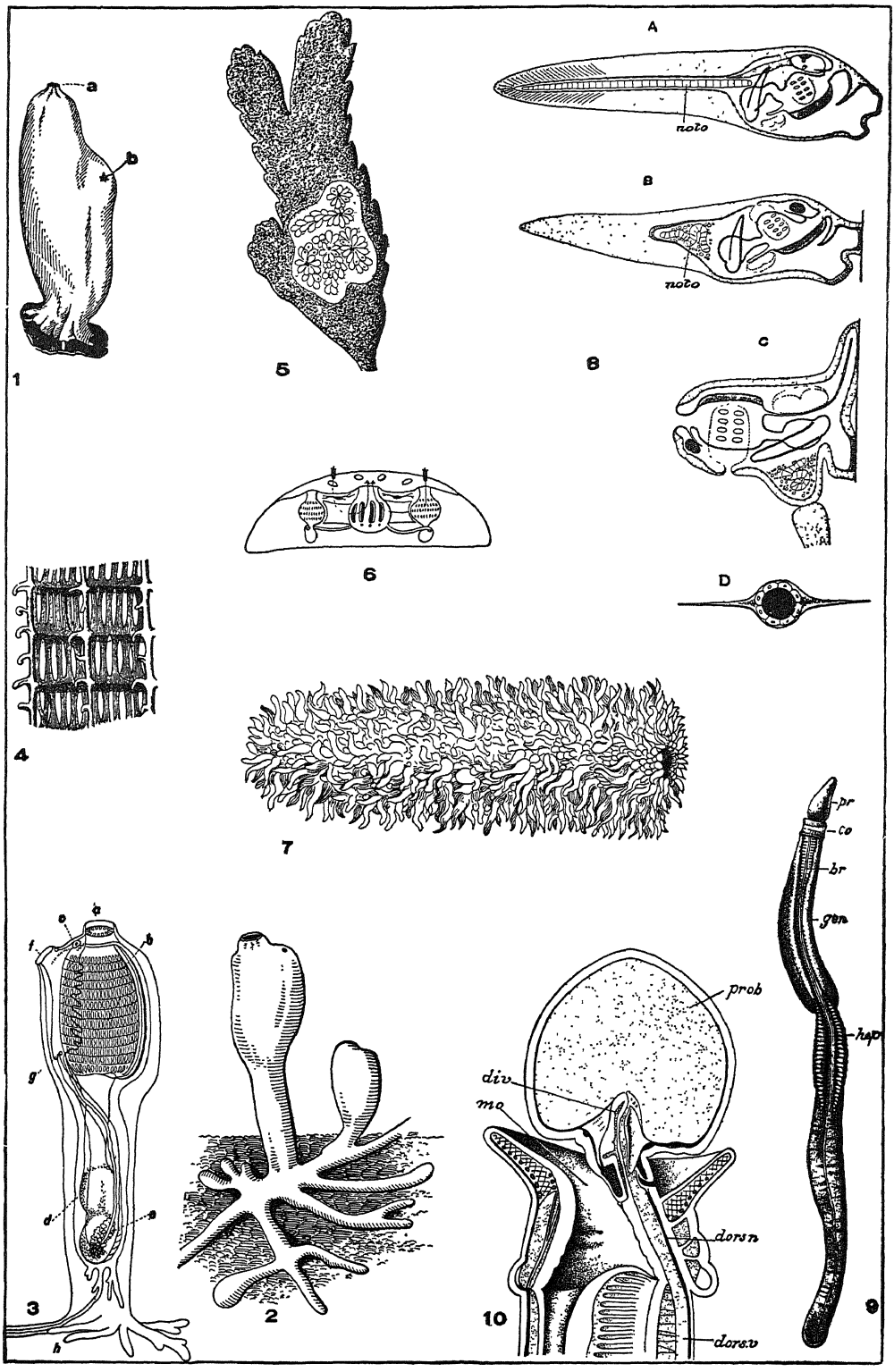
**ASCHERSLEBEN,** ä'shĕrs-lā'ben. A town in the Prussian province of Saxony. It is situated on the river Eine, 32 miles south-southwest of Magdeburg (Map: German Empire, D 3). It has considerable manufactures of beet sugar, woolens, linens, earthenware, tinware, chemicals, etc., and breweries, iron foundries, tanneries, etc. There are also coal and salt mines, and extensive beet gardens. Pop., 1890, 22,893; 1905, 27,876; 1910, 28,968. Aschersleben is mentioned in the twelfth century and was probably founded in the eleventh. It became Prussian in 1813.

**ASCHERSON,** ä'shĕr-zōn, PAUL FRIEDRICH AUGUST (1834–1913). A German botanist, born in Berlin. He studied medicine and natural science and in 1873 was appointed professor of botany at the university there. In 1873–74 he accompanied Rohlfs in his expedition to the Libyan Desert, which he again visited alone two years later. In 1884 he was made custodian of the Botanical Museum at Berlin. His principal contributions are on the subject of the flora of Europe and of Africa. His published works include *Flora der Provinz Brandenburg* (1864), and a *Synopsis der mitteleuropäischen Flora* (2d ed., 1912).

**ASCIANS,** ăsh'yanz, or ASCII, ăsh'ī-ī (Gk. *a,* priv. + *σκιά, skia,* shadow). People near the equator, who have the sun over their heads and who, consequently, have no visible shadow twice a year.

**ASCIDIAN** (Gk. *ἀσκίδιον, askidion,* dim. of *ἀσκός, askos,* a skinbag, a bladder), or TUNICATE (Lat. *tunicatus,* clothed with a tunic). One of the small marine animals, constituting the class Urochorda of the phylum Chordata, and popularly known as sea-squirts. They are of two kinds: (1) fixed and individual ones, to which

# ASCIDIANS AND BALANOGLOSSUS




1-6. ASCIDIANS.
7. PYROSOMA.
8 ASCIDIAN EMBRYOS.
9-10. BALANOGLOSSUS.

For explanation of details, see articles "Ascidian" and "Balanoglossus."

the name "ascidian" is more properly applied; and (2) compound free-swimming ones, more properly designated as tunicates. Their principal interest is the evidence they show of affinity with the vertebrates by the presence in their larval conditions of a notochord and other fundamental characteristics of the chordata. See Plate of ASCIDIANS AND BALANOGLOSSUS.

The larvæ at first are free-swimming, and resemble a tadpole. The tail is fringed with a delicate transversely striated fin; in the axis of the tail is the notochord, and above it the central nerve-cord, which anteriorly is dilated, and still farther forward again expands into a vesicle, which is a true sense-organ—a primitive eye. The enteric canal exhibits a mouth, a pharynx, œsophagus, stomach, and intestine; and there is a heart and blood circulation. After a few hours of existence in this stage, so suggestive of an embryo vertebrate, it becomes fixed by adhesive papillæ upon its "head"; its "tail," including the notochord, disappears, the nervous system diminishes to a single ganglion, the body takes the form of a dilated sac, with an incurrent and excurrent orifice side by side at the outer end, the reproductive organs develop, and a purely vegetative existence within such protection as is given by a leathery, contractile tunic, takes the place of the promising condition of early youth. Appendicularia, a minute animal swimming on the surface of the sea, is like an ascidian larva and preserves its chordate condition throughout life.

These simple, solitary ascidians are bi-sexual and increase only by spawning; but the composite tunicates form colonies by budding, as well as emit eggs, and the economy of some of these communities is very complicated. See BALANOGLOSSUS; CHORDATA; ALIMENTARY SYSTEM, EVOLUTION OF; NERVOUS SYSTEM, EVOLUTION OF; ETC. Consult Parker and Haswell, *Text-Book of Zoölogy* (New York, 1898).

EXPLANATION OF PLATE OF ASCIDIANS, ETC.

1. A SIMPLE ASCIDIAN: *a*, mouth; *b*, exhalent pore.
2. A CREEPING FORM (Clavellina), showing stolons.
3. SAME AS No. 2: *a*, mouth; *b*, branchiæ; *c*, nervous centre; *d*, stomach; *e*, genital gland; *f*, exhalent pore; *g*, anus; *h*, stolons.
4. PORTION OF BRANCHIÆ, enlarged.
5. AN ENCRUSTING COMPOUND ASCIDIAN (Botrylloides).
6. DIAGRAM OF PART OF 5, showing structure; the arrows indicate inward and outward water currents.
7. COLONY OF FREE LUMINOUS ASCIDIANS (Pyrosoma).
8. ASCIDIAN EMBRYOS (tadpole stage), showing changes of form with growth, and disappearance of notochord (*noto*); *a*, youngest full-swimming tailed stage; *b*, larva recently fixed; *c*, older fixed stage; *d*, section of tail of *a*, showing relation of fins to notochord.
9. BALANOGLOSSUS; *br*, branchial region; *co*, collar; *gen*, genital ridges; *hep*, prominences formed by hepatic cæca; *pr*, proboscis.
10. Enlarged section of upper part of 9; *prob*, proboscis: *div*, supposed notochord (diverticulum); *mo*, mouth; *dors*, dorsal vessel.

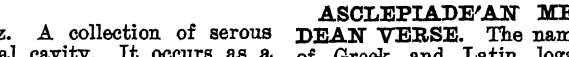
**ASCI'TES**, ă-sī'tēz. A collection of serous fluid in the peritoneal cavity. It occurs as a symptom of nephritis, chronic peritonitis, tuberculosis, heart disease, abdominal tumors, and especially of cirrhosis of the liver. The fluid is pale yellow, clear, with a specific gravity of 1.010 to 1.016, albuminous and coagulable. If bloody, cancer should be suspected. When it occurs in large quantity and breathing is difficult, the fluid must be drawn off repeatedly with aspirator or trochar, by the surgeon. Many cases, however, can be held in check by the administration of saline cathartics and diuretics, in conjunction with appropriate treatment directed to the particular organ at fault. In the case of cirrhosis of the liver an ingenious operation, devised by Talma, has proved effective when undertaken fairly early in the disease. *Omentopexy*, as it is called, consists in the suture of the peritoneum and omentum to the liver, thus establishing a collateral circulation and relieving the obstructed portal system.

**ASCLE'PIADA'CEÆ** (named after *Asclepias*). The milkweed family. A family of dicotyledonous plants, including herbs or shrubs, often with twining stems and mostly with a milky juice. The leaves are entire and without stipules. The flowers, commonly produced in umbels, are peculiar in structure, but perfectly symmetrical and regular; ovary of two carpels, styles short and united by their disk-shaped stigma; fruit of two follicles or pods; seed usually flattened and provided with long, fine hairs; embryo about as long as the seed; cotyledons flat.

This family, closely related to Apocynaceæ, embraces over 200 genera, and nearly 2000 species, which are widely distributed throughout the warmer portions of the globe, being especially numerous in Africa. The principal representative in the United States is the well-known *Asclepias*, or milkweed. The main sections of the family are Periplocoideæ represented by the genera *Periploca* and *Streptocaulon;* Asclepiadeæ, which includes *Asclepias* and *Cynanchum*, including *Vincetoxicum;* Tylophoreæ, of which the chief genera are *Marsdenia, Stephanotis, Cereopegia, Stapelia*, and *Hoya;* and Gonolobeæ, represented by *Gonolobus*. These plants vary widely in characteristics and uses. Many are cultivated for their perfume, as *Stephanotis floribunda*, etc.; others, such as some species of *Stapelia* and *Hoya*, are known as carrion flowers, from their repellent odor. Flies are attracted by them, and eggs are often deposited upon the flowers. Some species of *Asclepias* yield fibre from their stems, and the silky fibre of their pods has many uses. Among them are species of *Marsdenia, Periploca*, and *Orthanthera*. For the economic uses of others, see INDIAN SARSAPARILLA; MUDAR; ARGEL; CYNANCHUM.

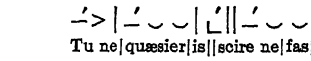
**AS'CLEPI'ADÆ** (Gk. *'Ασκληπιάδαι, Asklēpiadai*). Originally an association, claiming descent from the god of healing, Asclepius, or Æsculapius, in which the practice of medicine was hereditary. Later those not connected by blood were admitted, and the organization, which existed in various parts of Greece, became a training school for physicians. After the time of Hippocrates the Asclepiadæ seem to have required a comprehensive course of study of their candidates, and the Hippocratic Oath (q.v.) shows the ethical standard they maintained.

**ASCLEPIADE'AN METRE, ASCLEPIADEAN VERSE.** The name given to two kinds of Greek and Latin logaœdic verse, named, probably, after Asclepiades of Samos. 1. The Lesser Asclepiadean consisted of an irrational trochee, cyclic dactyl, syncopated foot, cyclic dactyl, trochee, syllaba anceps, thus:




2. The Greater Asclepiadean consisted of an irrational trochee, a cyclic dactyl, a syncopated

foot, a cyclic dactyl, syncopated foot, cyclic dactyl, trochee, and a syllaba anceps, thus:



Tu ne|quæsier|is||scire ne|fas||quem mihi|quem ti|bi.

In a word, the combination – ⏑ ⏑ | ⏑ is inserted between the halves of the Lesser Asclepiadean. The Lesser Asclepiadean is combined with the Glyconic metre into various systems, all employed by Horace.

**ASCLEPIADES,** ăs'klē-pī'ă-dēz (Gk. *Ἀσκληπιάδης, Asklēpiadēs*). A Greek physician, born at Prusa or Cius, in Bithynia. He lived at the beginning of the first century B.C., at first a teacher of oratory at Rome, and friend of L. Crassus, the famous orator, but later, without any preparation, a practitioner of medicine. What he lacked in real knowledge he supplied by clear-sightedness and understanding of human nature. He made unlimited use of wine, recommended frequent baths, dieting, and exercise, and denounced the excessive use of emetics and purgatives. In all this he followed largely Cleophantus, son of Cleombrotus, a physician of the third century B.C. He taught that all disease arose from an inharmonious distribution of the small, formless corpuscles of which the body is composed. He is said to have been the first to distinguish between acute and chronic diseases, but his knowledge of anatomy was apparently slight. Seventeen treatises of Asclepiades are mentioned. The fragments of his writings, which have been preserved, were edited by Gumpert, *Asclepiadis Bithyni Fragmenta* (Weimar, 1798). Consult also G. M. Reynaud, *De Asclepiade Bithyno Medico ac Philosopho* (Paris, 1862).

**ASCLEPIADES** OF SAMOS. A Greek lyric poet of the third century B.C., a younger contemporary of Theocritus. He was the author of 43 epigrams, mostly erotic, included in the Greek anthology, known as *The Garland,* prepared by Meleager (see ANTHOLOGY); many of them are among the prettiest epigrams of the erotic type. The Asclepiadean metre was probably named after him.

**ASCLE'PIAS** (so named from Asclepius, father of medicine), or SWALLOW WORT. A genus of the order Asclepiadaceæ, most of the species of which are American, and commonly called milkweeds, on account of the milky exudation from any part cut or injured. The numerous seeds contained in the pods are copiously covered with down and are dispersed by the wind. The milky juice of some species is said to contain caoutchouc, or a substance resembling it. The corolla is wheel-shaped, and reflexed with a corona of variously hooded appendages. The fibre of the stem of some species is strong and has been used for making ropes; the lint in the pods has been used for pillows, etc. While fine and silky, it lacks twist and cannot be used for spinning. *Asclepias cornuti,* or *Asclepias syriaca,* and *Asclepias tuberosa,* pleurisy root, are common plants, the latter possessing diaphoretic, carminative, and expectorant properties, and used in medicine for pectoral affections, such as pleurisy and bronchitis. The young shoots are sometimes used as a substitute for asparagus, to which they bear some resemblance. A few fossil leaves from rocks of Tertiary Age at Kumi, Greece, have been referred to the genus *Asclepius.* See Plate of MINT.

**ASCLE'PIUS.** See ÆSCULAPIUS.

**ASCOLI,** ăs'kō-lē, GRAZIADIO ISAIA (1829–1907). An Italian philologist of European celebrity, and one of the pioneers in modern methods of comparative linguistics. He was born of a wealthy Jewish family at Görz, in the Austrian province of that name. Trained by his father for a business career, he pursued his linguistic studies without masters, and at the age of 15 gave evidence of exceptional talent by publishing a paper upon the relation between Wallachian and the Friuli dialect. His first important work, *Studi orientali linguistici* (1854), established his reputation and led to his appointment in 1860 to the chair of philology at the Accademia Scientifico-Letteraria of Milan. In addition to his academic work, he found time to issue a number of important volumes, including *Studi critici* (2 vols., 1861–77); *Studi irani* (1867); *Corsi di glottologia* (Turin, 1870); and his most notable work, *Saggi ladini* (1873), which marked an important advance in the methods of Romance philology, and initiated the monumental *Archivio glottologico italiano* (1873–1912), which under his editorship became the receptacle of the most important contributions made by him and by his pupils to the study of Celtic and Italian dialects. The numerous honors bestowed upon Ascoli testify to the wide recognition of his talents. He became a member of the Institute of France, of the Academies of Vienna, Budapest, Berlin, and St. Petersburg, was elected to the Italian Senate in 1888, and successively chosen as delegate of Italy to the Oriental congresses at Berlin, London, and Geneva. For bibliography, consult *Miscellanea di studi in onore di G. I. Ascoli* (Torino, 1901).

**ASCOLI PICENO,** ăs'kō-lē pē-chā'nō (Lat. *Asculum Picenum*). The capital and an episcopal city of the province of Ascoli Piceno, in central Italy, on a hill beside the Tronto, 73 miles southwest of Ancona by rail (Map: Italy, H 5). A branch railway, 21 miles long, connects it with an inferior harbor on the Adriatic and with the Bologna-Brindisi Railway. The public buildings are beautiful, and constructed chiefly of marble, and there are several churches, a cathedral, a castle, a museum, and a picture gallery. Almost all traces of the ancient Asculum Picenum have disappeared, but several Roman bridges are still in general use. Ascoli is surrounded by rich agricultural land, and its manufactures include majolica ware, glass, wax, silks, leather, hats, and cloth. It is commercially very active. Pop., 1881, 11,200 (commune, 23,225); 1901 (commune), 28,882; 1911, 30,058.

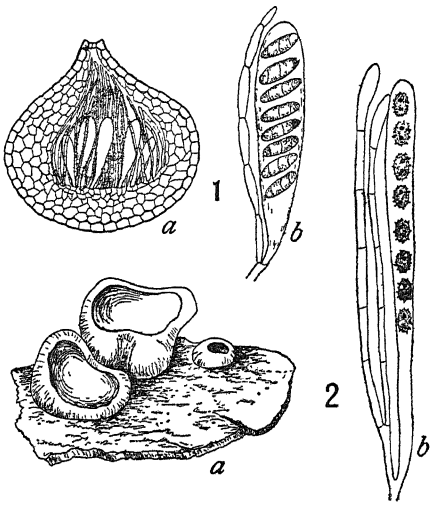
**ASCOLI SATRIANO,** sä'trē-ä'nō. A city and episcopal see in the province of Foggia, south Italy, 20 miles south of Foggia by rail. It is the ancient Asculum Apulum, celebrated as the scene of the defeat of the Romans by Pyrrhus, 279 B.C. Pop., 1881 (commune), 9906; 1901, 8550; 1911, 9701.

**ASCOMYCETES,** ăs'kō-mī-sē'tēz (Gk. *ἀσκός, askos,* skin-bag + nom. pl. *μύκητες, mykētes,* mushrooms, fungi). The largest of the three groups of true Fungi, including approximately 30,000 known species. The common character of this great assemblage of forms is the presence of an "ascus." An ascus is a special cell which produces spores (ascospores) in a characteristic way. The young ascus contains two nuclei, which unite to form a "fusion nucleus," and this fusion is followed by three successive divisions, resulting in eight nuclei. In connection with these nuclei the ascospores are formed, so that theoretically there are eight ascospores in an

ascus. Although there are usually eight ascospores, a larger number may appear by further division of the original eight; or there may be a smaller number through failure of ascospore formation in connection with some of the eight nuclei.

The asci appear in groups, generally forming a more or less extended layer (hymenium), and usually the hymenium is invested by a sterile jacket, the whole structure then being called an "ascocarp." Intermixed with the asci there are usually sterile, filamentous structures (paraphyses), so that an ascocarp consists of three elements—asci, paraphyses, and sterile jacket. Sex organs have been observed among the Ascomycetes sufficiently to indicate that ascocarps arise as a result of the sex act, although in many cases the sex act may have been eliminated.

The production of ascocarps is one phase in the life history of Ascomycetes. The other phase,

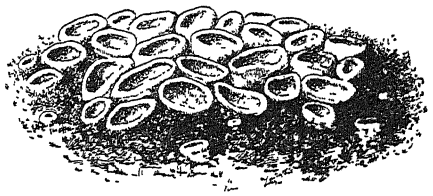



(1) Macrosporium; *a*, section of perithecium showing asci and paraphysis; *b*, a single ascus with 8 ascospores, and a paraphysis; (2) *Lachneo-hemispherica; a*, apothecia; *b*, an ascus with paraphyses.

which is usually much more conspicuous, is that in which characteristic spores (conidia) are produced. There are thousands of Ascomycetes whose conidium stage and ascocarp stage have not been connected; and these conidia-bearing forms, whose ascocarps are unknown, are called "imperfect Fungi" (*Fungi imperfecti*). It is this conidium stage that is of special economic importance, for it is the cause of many destructive diseases of useful plants.

Although usually eight orders of Ascomycetes are recognized, they may all be considered in four groups, dependent on the character of the ascocarp. In one group there is no ascocarp, the asci (hymenium) appearing without any investment by a jacket. To this group belong such forms as the "yeasts" (somewhat doubtful Ascomycetes) and the parasites that induce the diseases known as "peach-leaf curl," "plum pockets," and certain of the "witch brooms."

In the second group the ascocarp has the form of a flat disk, a cup, or a funnel, in each case lined with the hymenium (the layer of asci and paraphyses). These widely open ascocarps are called "apothecia" (singular, "apothecium"), and the Ascomycetes with such ascocarps have long been called "Discomycetes," or "cup Fungi." The hymenium lining the cups of these Fungi is often brightly colored, a very common illustration being the so-called "scarlet cup." Most of



PEZIZA, A CUP FUNGUS.

the Lichens belong here, for Lichens are chiefly cup Fungi that are parasitic upon certain Algæ. The common "morel," usually thought of as a mushroom, is also related to this assemblage, for although its ascocarp (the "morel" which is eaten) is not cup-shaped, the hymenium is freely exposed in depressions upon the surface of the mushroom-like ascocarp.

In the third group the ascocarp is a completely closed structure (cleistothecium). To this group belong the "truffles," whose fleshy ascocarps are subterranean; the various blue and green "molds," such as appear on bread, preserves, herbarium specimens, etc.; and the "powdery mildews," so very common on flowering plants, and always to be seen upon the leaves of lilac, covering them with its whitish growth.

In the fourth group the ascocarp is flask-shaped (perithecium), being neither widely open nor completely closed. This is far the largest assemblage of Ascomycetes, and contains most of those that cause destructive diseases of plants. In general they are called the "black Fungi" (Pyrenomycetes), because frequently they produce dark, wart-like excrescences on twigs that look like charred spots. Among the destructive diseases induced by this group is the "black knot," so common on plum and cherry trees; and also the "ergot fungus," which is parasitic in the young grains of grasses, especially rye, and from which the medicinal ergot is obtained. Since many of the "imperfect Fungi" probably belong here, some of the diseases they induce may be mentioned as follows: "cankers" (especially destructive in forest plantations), "wilts" (wilts of cotton, cowpea, and watermelon being notable diseases in the southern States), "scabs" (a very common disease in apple orchards), "bitter rot" of apples and other fruits, etc.

**ASCO'NIUS PE'DIA'NUS,** QUINTUS (c.3–c.88 A.D.). A Roman critic and historian. He was born probably at Patavium, but lived mainly at Rome. During the reigns of Claudius and Nero he made a careful study of state papers then extant, and wrote his valuable historical commentaries on Cicero's Orations, of which only those on the five orations, "In Pisonem," "Pro Scauro," "Pro Milone," "Pro Cornelio," and "In Toga Candida," are preserved. These, too, are in a fragmentary condition, but the fragments are of great value, because Asconius' work rested on a careful study of Cicero's writings and those of his contemporaries and on an examination of official documents. The commentaries, written in pure Latin, refer chiefly to points of history and antiquities, and contain interesting accounts of those constitutional forms of the senate, popular assemblies, and the courts of justice, which under the Empire were

rapidly disappearing. The notes on the Verrine Orations are of a much more grammatical cast and exhibit traces of a declining Latinity, so that, though originally ascribed to Asconius, they are probably to be attributed to a grammarian of a later date. Consult Madvig, *De Asconii Pediani Commentariis* (Copenhagen, 1828). Asconius is known to have written also a life of Sallust and a treatise against Vergil's critics, but these have been lost. For the text of Asconius' extant writings, consult C. G. Schultze's and Orelli-Baiter's editions of Cicero, and the edition of Asconius himself by A. C. Clark (Oxford, 1906). Consult also Thomas Stangl, *Ciceronis Orationum Scholiastæ*, vol. ii (Leipzig, 1912).

**AS'COT HEATH.** A famous English race-course (of almost exactly 2 miles) in the parish of the same name, in Berkshire, about 29 miles southwest of London. It was laid out in 1711 by order of Queen Anne, who attended the first meeting that year. The Ascot Gold Cup race was founded in 1771, and in 1807 a gold cup was first awarded. The track was improved in 1902. The meetings are held in June. Consult Cawthorne and Herod, *The Royal Ascot; Its History and its Associations* (London, 1902), and Rice, *History of the British Turf* (2 vols., London, 1879).

**ASCOT RA'CES.** One of the most fashionable horse-races in England, held at Ascot Heath in Berkshire.

**ASCUT'NEY** (Ind. 'Three Brothers'). A mountain rising 3329 feet above the level of the sea near the Connecticut River in Windsor Co., Vt. It presents a fine example of a *monadnock* (q.v.). From its summit a beautiful view of the Connecticut valley may be obtained. There are granite and olive-green syenite quarries.

**ASELLI,** ȧ-sĕl'lē, **ASELLIO,** ȧ-sĕl'yō, or **ASEL'LIUS,** GASPARO (c.1581–1626). A celebrated Italian physician, professor of anatomy and surgery at Pavia. In 1623 he discovered the lacteal vessels. Before his time anatomists had supposed that the chyle was carried from the intestines into the liver by the mesenteric veins. While dissecting a living dog, he noticed for the first time the multitude of little vessels which suck up the nutritive portion of the food. At first he mistook them for nerves and did not pay particular attention to them; but on pricking one with the point of his scalpel, a white liquid spurted out, and the discovery flashed on him. He seems, however, never to have understood or described them with complete accuracy. In the year following his death a treatise on the subject of his discovery was published, entitled *De Lactibus, sive Lacteis Venis.*

**ASEN,** ä'sen. The name of some of the Mediæval Bulgarian czars—JOHN ASEN I (1186–95) freed his country from the domination of Byzantium, added Sophia to his dominions, and made Tirnova the Bulgarian capital. JOHN ASEN II (1218–41), son of the preceding, was forced to flee to Russia when his uncle usurped the throne. His return to Bulgaria opened a new era for the nation. Theodore of Epirus, "Emperor of the East," was overthrown, and Albania and Macedonia conquered. Asen was thus afforded an opening on the Adriatic, which he used for the commercial advancement of Bulgaria.

**AS'ENATH.** The daughter of Potipherah, priest of On, wife of Joseph (Gen. xli. 45, 50; xlvi. 20). The name seems to be the Hebraized form of the Egyptian *'ws-n-nt,* 'she belongs to Neith.' Names of this type occur in the XXI Dynasty, and become frequent in the XXVI or Saite Dynasty. Consult Spiegelberg, *Agyptologische Randglossen zum alten Testament,* p. 184 (1906).

**ASENATH,** LIFE OF. See APOCRYPHA.

**ASEP'SIS.** See ANTISEPTICS.

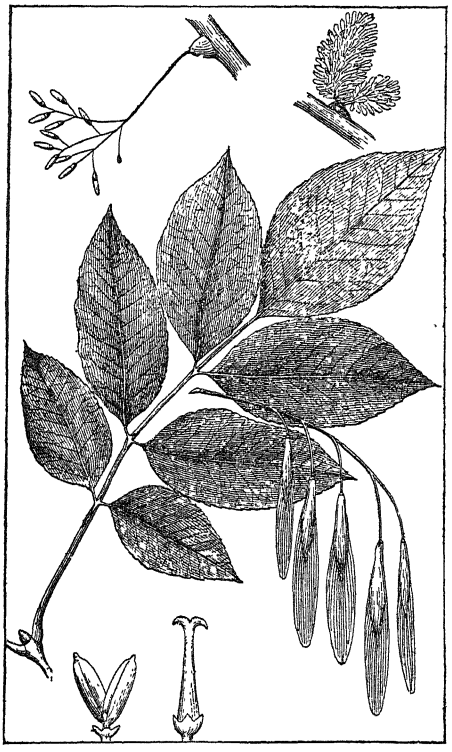
**AS'ES.** See ÆSIR.

**ASGARD,** ăs'gärd (Old Norse *ăss,* god + *gardhr,* garth, inclosure, home). The home of the Norse gods, or the Scandinavian Olympus. It was said to stand in the middle and highest part of Ida's Plain, which is the centre of the universe. There the Æsir ('gods') built a hall, *Glads-heim* ('home of joy'), with seats for 12, and one high-seat for Odin, the All-father; and also a lofty abode called Vingolf, for the goddesses. The gods worked diligently, played at games, were rich in precious things, and happy until three maidens from Jötunheim, 'giants' world,' crossed the plain and entered Asaheim, when corruption began to spread among the inmates. Asgard had many mansions, the largest and noblest of which was Gladsheim, while another, not so large, but fairer and brighter than the sun, was called Gimle, i.e., the house of the jeweled roof. The latter mansion will stand when heaven and earth shall have been destroyed by fire and will be the dwelling place of brave and upright men. There is an historical explanation of this myth: that Asaheim was a country east of the Don in Asia, where there was a city of Asgard, in which ruled a chief named Odin, or Wodan; that Odin, fearing subjection by the Romans, led his people across Russia to Sweden and settled at Sigtuna (Upsala); that his priests or chief men founded other settlements and established the worship of their ancestors; that in lapse of time the man Odin and his chiefs came to be looked upon as gods. No date can be settled for such a migration; but from 120 to 80 B.C. has been thought probable, for then Mithridates Eupater was defying the armies of Rome. This theory is based on the account in Heimskringla, which is, however, of doubtful value. See ÆSIR; SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

**ASGILL,** ăs'gĭl, JOHN (1659–1738). An eccentric English writer. He was born at Hanley Castle, Worcestershire, and studied for the bar. At intervals during the whole of his checkered life he practiced his profession in some form or other; but he was continually involved in financial and other difficulties. Fortunately for him, Parliament had just passed an act (1700) for the resumption of forfeited estates in Ireland, and commissioners were appointed to settle claims. Seeing his opportunity, he went to Ireland and found the whole country wrangling in lawsuits. His talents, and the favor of the commissioners, secured to him a lucrative practice; and he even acquired sufficient influence to obtain a seat in the Irish Parliament. Some time, however, before taking his seat, Asgill had published a most extraordinary pamphlet, entitled *An Argument Proving that, According to the Covenant of Eternal Life, Revealed in the Scriptures, Man May Be Translated Hence into the Eternal Life Without Passing Through Death, Although the Humane Nature of Christ Himself Could not thus be Translated till He had Passed Through Death* (1700). The Irish Parliament voted the treatise a libel and expelled the author. Asgill returned to England and entered the English Parliament in 1705 as a member for

Bramber, in Sussex. But the fame of his unlucky pamphlet at last proved a Nemesis; for the English House, resolving to be not less virtuous than the Irish one, took up the treatise, condemned it to be burned by the common hangman, as profane and blasphemous, and expelled Asgill (1707). After this, his circumstances rapidly grew worse, until he finally found something like peace in two prisons, the King's Bench and the Fleet, between which his excursions were confined for the remainder of his life. The famous pamphlet by which Asgill is remembered, was much praised by Coleridge for its irony. The case for man was, indeed, capitally argued in terms of the English law. Asgill professed to believe that he was to be translated without dying. Consult the Gregg edition of the argument (New York, 1875), and Coleridge, *Table Talk*, April 30, 1832, reprint (London, 1883).

**ASH** (AS. *æsc*, MHG. *asch*, Ger. *Esche*), *Fraxinus*. A genus of trees belonging to the family Oleaceæ. The leaves are deciduous and



ASH-TREE LEAF AND FRUITAGE.

are pinnate with a terminal leaflet. There are about 50 species, mostly natives of Europe, eastern Asia, and North America. The common ash (*Fraxinus excelsior*) grows wild in the middle and south of Europe and in the north of Asia. It is an undoubted native of Great Britain. The flowers are naked; the leaves have five or six pairs of leaflets. The flowers appear before the leaves in spring; indeed, the tree is not covered with leaves until the season is far advanced and loses them again early in autumn. It is, however, a most beautiful and umbrageous tree, highly ornamental in parks; but in parks or hedgerows it is injurious to the grass or crops immediately around it. It rises to the height of 100 to 150 feet, generally with a smooth stem. The wood is white, tough, and hard, much valued by wheelwrights, cartwrights, coachmakers, joiners, and turners. It is also excellent for fuel. Sometimes it becomes irregular in the disposition of its fibres and finely veined, and is then prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The ash prefers a loamy soil, but grows in almost any, and flourishes in situations too elevated or too exposed for most other trees. It has been extensively planted in elevated situations in some parts of the north of Scotland, and there, in the more sheltered glens, it grows to a large size. Cultivation has produced and perpetuated a number of varieties, of which the most remarkable are the *weeping* ash, with boughs bent almost straight down to the ground; the *curl-leaved* ash, with dark-green wrinkled or curled leaves; and the *entire-leaved* ash, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *Fraxinus simplicifolia*, *Fraxinus heterophylla*, etc. The small-leaved ash (*Fraxinus parvifolia*) and the lentisk ash (*Fraxinus lentiscifolia*) are both natives of the shores of the Mediterranean and are very graceful and ornamental trees. The American ash, or white ash (*Fraxinus americana*), is readily distinguished from the common European ash by its lighter bark and paler green leaves. The leaves have a rhachis, and the leaflets are shortly stalked and entire (those of the common ash are sessile and serrated). It is abundant in New Brunswick and Canada, but is less common south of New Jersey and west of Minnesota and Kansas. The trunk often rises more than 40 feet undivided. The wood is used for the same purposes as that of the common ash. The red ash (*Fraxinus pubescens* or *Fraxinus pennsylvanica*) is very similar, but of smaller size, and has a deep-brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground. The black ash or water ash of the New England States, New Brunswick, etc. (*Fraxinus sambucifolia* or *Fraxinus nigra*), is a large tree, with buds of a deep-blue color. This tree is more commonly found in wet places than the other species. Its wood is soft, tough, and easily separable into thin layers, on which account it is commonly used for barrel hoops, staves, and for splint baskets, etc. The blue ash of Ohio, Kentucky, Tennessee, etc. (*Fraxinus quadrangulata*), is also a large tree. The inner bark of this species gives a blue color to water, hence the name. The branches are quadrangular, the young shoots having on the angles four membranes which extend their whole length. The green ash (*Fraxinus viridis* or *Fraxinus lanceolata*), readily recognized by the brilliant green of its young shoots, is chiefly found in the Middle States; on account of its hardiness, the green ash is extensively planted for wind-breaks, and as an ornamental in Minnesota and the Dakotas. It is easily propagated from seed and is of very rapid growth. The wood is less valuable than that of the white ash. The Carolina ash (*Fraxinus caroliniana*), remarkable for the great size of its leaflets, is found chiefly in the southern States. Besides these, North America produces about a

dozen other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the common ash. In the south of Europe grows the manna ash or flowering ash (*Fraxinus ornus*, called *Ornus europœa* by some botanists), whose flowers have a four-partite calyx and four small yellowish-white petals. The tree has much resemblance to the common ash. From it the substance called manna (q.v.) is obtained by means of transverse incisions in the bark; but in very favorable situations it flows spontaneously during the greatest heat of summer. Manna is chiefly collected in Calabria and Sicily. A nearly allied species, *Fraxinus rotundifolia*, a native of Greece and the Ionian Islands, yields it also in perhaps equal quantity. The common ash is said sometimes to produce the same exudation in the same warm climates.

The mountain ash or rowan tree belongs to a different family, its resemblance to the ash being chiefly in its leaves. Fossil forms of the ash (*Fraxinus*) are known in all the Tertiary beds above the Eocene, in Europe, but have not been found in beds of equivalent age in North America. Consult G. Nicholson, *Illustrated Dictionary of Gardening* (London, 1884–89), L. H. Bailey, *Cyclopœdia of American Horticulture* (New York, 1900–01), and C. S. Sargent, *Manual of the Trees of North America* (Boston, 1905).

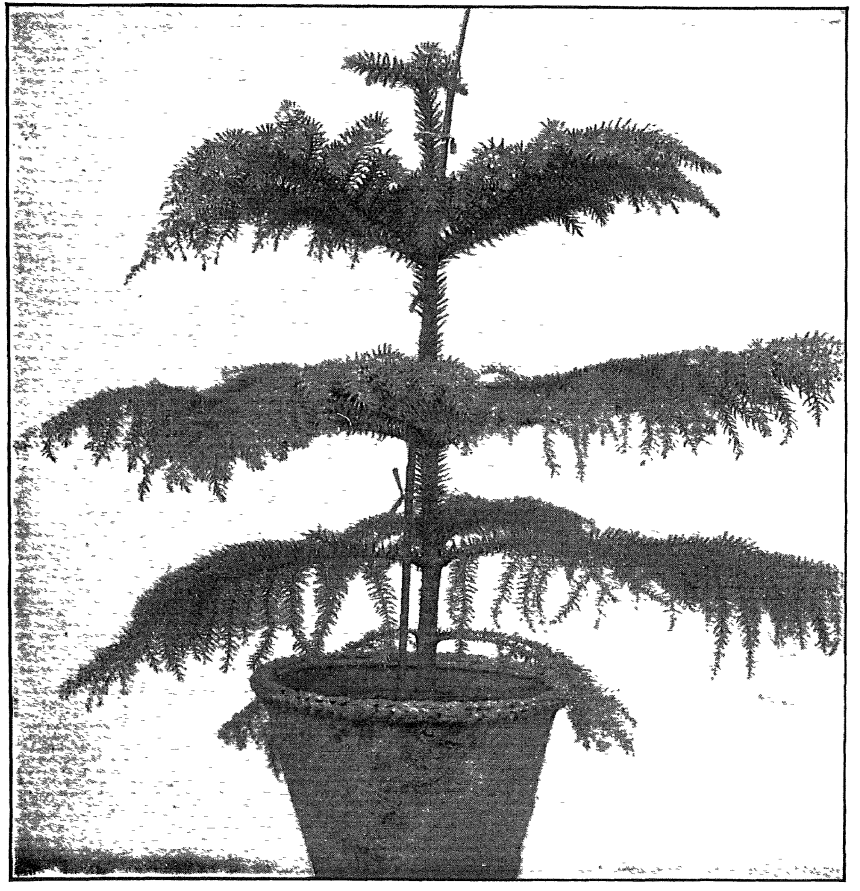
**ASHANTI,** ă-shăn'tē, or **ASHANTEE.** A British possession (formerly a negro kingdom) in west Africa, separated from the Gulf of Guinea by the British Gold Coast colony (q.v.), of which it has practically been a part since 1896 (Map: Africa, D 4). Its boundaries were defined by an order of the King in council dated Sept. 26, 1901, and by a subsequent order dated Oct. 22, 1906. The area is estimated at about 20,000 square miles. It is a fertile and well-watered region. Dense tropical forests, rich in cabinet woods and rubber and resinous plants, cover an area estimated at 12,000 square miles. Increased attention is being paid to the cultivation of the soil by the natives, especially in the planting and care of the kola-nut tree. Cacao plantations are extending. Other agricultural products are yams, grains, fruits, vegetables, tobacco, gum copal, rubber and dyewoods. Gold is found in quartz and alluvial deposits; the output in 1905 was 68,259 ounces (£254,790) and in 1911, 124,878 ounces (£530,853). The natives have several well-developed industries and are skilled workers in metals and in the weaving of fabrics as well as in the production of earthenware. The ornaments of gold and silver found in the palace at Kumasi in 1874 bore evidence of much artistic skill. The railway line from Sekondi, on the coast, to Kumasi, the capital of Ashanti, is 168 miles long. The population of Ashanti, according to the census of 1911, was 287,814. The natives are negroes and are divided into numerous tribes, each governed by its own headman, and all, previous to the deposition of Prempeh, in 1896, subject to the King of Kumasi as king paramount. Among these tribes are the Bekwais, Kokofus, Kumasis, Daniassis, and Mampons. Physically the inhabitants of Ashanti are strong and well developed. Their speech belongs to the Tshi group. They practice polygamy and their religion is a mixture of ancestor worship and animism or nature worship. The capital is Kumasi, with a population, 1911, of 18,853. Obuassi, Wam, Nkoranza, Atabubu, and Kintampo are other towns; Kintampo, an old slave mart, is now a station for the kola-nut trade.

The beginnings of the Ashanti kingdom are obscure, but traditions point to an immigration from the north of negro tribes fleeing from oppression at the hands of the Niger Moors, whose capital was Timbuktu. Our first positive glimpse of it is in the year 1700, when Kumasi was made the capital by Osai Tutu I, who conquered Akim, Assin, Gaman, Denkira, and other neighboring states. His successors continued the campaign of conquest; and about 1807 the Ashantis invaded the Fanti domains, thereby reaching the coast, where they became involved in a war with the British. Treaties were concluded and broken. From 1824 to 1826 the British met with heavy reverses, but at Dodowah the Ashantis were entirely routed. In 1831 they were driven from the seacoast, and the river Prah was fixed as the southern boundary of their kingdom. In 1873–74, in consequence of disputes arising in connection with the cession of the Dutch fort of Elmina to Britain, war broke out again, and an army under Sir Garnet Wolseley forced its way to the centre of the kingdom. After a severe battle at Amoaful and several days' fighting, Kumasi was taken Feb. 4, 1874, and burned on the 6th; and though the rainy season had set in, the British army returned in safety to the coast. The King submitted and promised to pay tribute and end the slave traffic. In 1895 the King of Ashanti (Prempeh), having molested the English settlers on the coast and raided the natives in numerous slave-hunting expeditions, a strong British force was sent again to Kumasi, which it reached with little resistance. The kingdom was then made a British protectorate (1896). In the spring of 1900 the Ashantis rose in sudden rebellion. The British governor of the Gold Coast colony and some 700 troops were pent up in Kumasi by 15,000 Ashanti warriors. On June 23 Governor Hodgson, with part of the garrison, succeeded in getting away to the coast, and on July 15 a relief expedition entered the town. The siege had lasted nearly four months. The country was definitively annexed to Great Britain Sept. 26, 1901. It is separately administered by a chief commissioner under the control of the governor of the Gold Coast, but the laws of the latter colony do not apply to it. Consult: H. C. J. Biss, *The Relief of Kumasi* (London, 1901); H. A. Freeman, *Travel and Life in Ashanti and Jaman* (London, 1898); C. C. Reindorf, *History of the Gold Coast and Ashanti* (Basel, 1895).

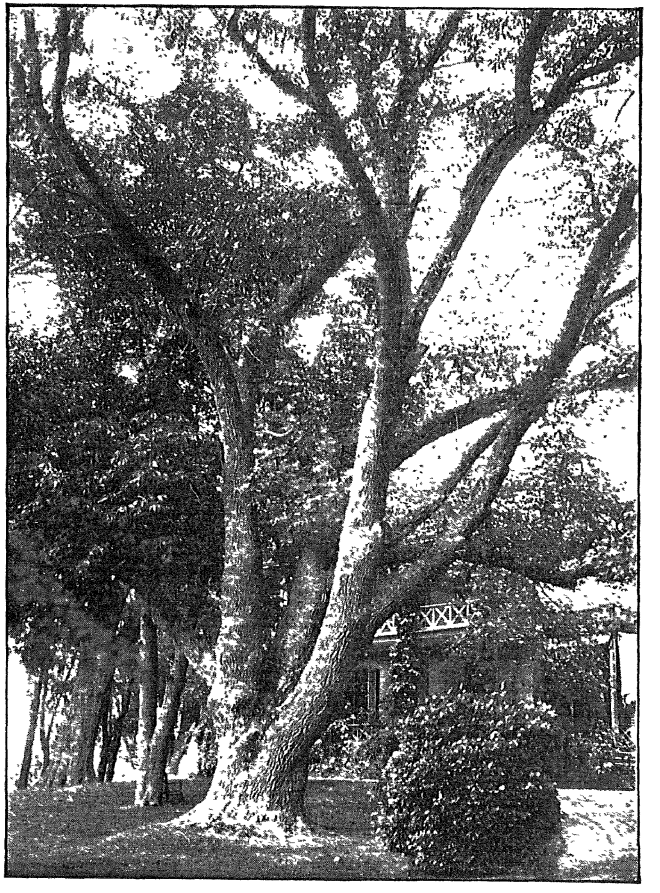
**ASH'BOURNE,** Edward Gibson, Baron (1837–1913). An Irish barrister and politician. After studying at Trinity College, Dublin, he became a barrister in 1860 and Queen's counsel in 1872. Having served as a member of Parliament (1875–85), and as Attorney-General for Ireland (1877–80), he was made Lord Chancellor of Ireland in 1885. In this latter office he was continued, with a seat in the cabinet, until 1892, and he again held it from 1895 to 1906. He was created first Baron Ashbourne in 1885.

**ASH'BURNER,** Charles Albert (1854–89). An American geologist, born in Philadelphia, where he received his collegiate education. He became engaged in the geological survey of Pennsylvania, in the capacity of assistant, and afterward was made head geologist, and carried on valuable investigations in connection with the

# ASH AND ARAUCARIA



ARAUCARIA EXCELSA, as a house plant



ASH (Fraxinus americana)

survey of the coal fields of Pennsylvania. He was a member of many scientific societies. His name is well known among geologists, both in this country and abroad, and is intimately associated with the history of coal stratigraphy. His writings include a large number of papers, especially on the subjects of coal, petroleum, and natural gas, contributed to various scientific and technical journals and to the reports of the Pennsylvania Geological Survey.

**ASH'BURTON,** BARON. See BARING, ALEXANDER.

**ASHBURTON RIV'ER.** A river of Western Australia, rising in the mountains west of the Great Sandy Desert and flowing 400 miles northwestward into the Indian Ocean, north of Exmouth Gulf. The Tropic of Capricorn crosses its middle course and here, and to some extent below, grass lands and trees border the river. It reaches the sea, however, through the desert coastal strip of Western Australia (Map: Western Australia, B 6).

**ASHBURTON TREA'TY.** See BARING, ALEXANDER; WEBSTER-ASHBURTON TREATY.

**ASH'BY,** TURNER (1824–62). A Confederate general. Early in 1861 he raised a regiment of cavalry, and by successive promotions attained the rank of brigadier-general in 1862. In May, 1861, he commanded at Point of Rocks, near Harper's Ferry, and in the spring of 1862 covered General Jackson's retreat before General Banks, earning the highest praise for his ability and gallantry. In June, 1862, he was killed in a skirmish at Harrisonburg, Va., two days before the battle of Cross Keys. Consult J. B. Avirett, *The Memoirs of General Turner Ashby and his Compeers* (Baltimore, 1867).

**ASHBY-DE-LA-ZOUCH,** ăsh'bĭ-de-lă-zōōsh' *or* -zōōch' (after the Norman family La Zouch). A small town of Leicestershire, England, about 17 miles northwest of Leicester (Map: England, E 4). The town was once celebrated for its manufacture of stockings, hats, and fire-brick, but these industries have greatly declined. In the neighborhood there are saline springs; while coal, limestone, and fine clay are also found. The church of St. Helen is a rather handsome building; and the castle to the south of the town, now in ruins, known from Scott's *Ivanhoe,* was once the prison of Mary, Queen of Scots. Pop., 1891, 4500; 1901, 4700; 1911, 4927. Consult E. Mammatt, *History and Description of Ashby-de-la-Zouch* (London, 1852).

**ASH'BY-STER'RY,** JOSEPH. An English critic. He was born in London and was educated as a painter, but soon turned to journalism. He has written some brilliant verses, sketches, and novels, such as *Nutshell Novels* (1890); *Lazy Minstrel* (1892), which has run through many editions; *Naughty Girl: A Story of 1893* (1893); *A Tale of the Thames in Verse* (1896); and *The Bystander; or, Leaves for the Lazy* (1900); *Sketches in Song* (1903); and *River Poems* (1909).

**ASH'DOD** (Heb. stronghold). One of the five confederated Philistine cities, the modern village of Esdud, 3 miles from the Mediterranean coast, between Gaza and Joppa. It had a commanding situation and possessed a famous Dagon temple, in which the captured Yahwe ark was placed (1 Sam. v.). Sargon sent his general against this city in 711 B.C. Azuri had been superseded by his brother Ahimiti, and he had been overthrown by Yamani (or Yawani). Yamani was forced to flee to Muzri. Ahi-milki, King of Ashdod, is mentioned by Esarhaddon. According to Herodotus, the city was besieged 29 years by Psammetichus I (663–610 B.C.). In the time of Nehemiah an Ashdodite dialect was spoken by the children in Jerusalem whose mothers were Philistines. Whether this was a Canaanitish or Aramaic dialect cannot be determined. Jonathan took the city in 147 B.C. and burned the Dagon temple. Pompey enfranchised the city. As Azotus, it became a centre of Greek civilization, and was also the seat of a Christian bishop.

**ASHE,** ăsh, JOHN (1720–81). An American soldier. He was born in North Carolina; was a representative in the Colonial Assembly, and its presiding officer (1762–65), and was a member of the first Provincial Congress. Early in 1775 he recruited a force of 500, with which he took Fort Johnson, and in the following year he became brigadier-general of the North Carolina State troops. He was with General Lincoln in 1779, and while commanding an expedition sent to relieve Augusta, Ga., was surprised and defeated by General Prevost (March 3), at Brier Creek. In 1781 he was made a prisoner at the capture of Wilmington (February 1), and after being treated with the utmost cruelty, died of smallpox, October 24. Asheville, N. C., was named in his honor.

**ASH'ER** (Heb. blessed). The name given in Gen. xxxv. 26, to the eighth son of Jacob, being the second born to him by his concubine Zilpah, the handmaid of Leah. Asher is thus merely the customary eponymous hero of the tribe of Asher, which formed part of the confederation known as the Bene Israel. The genealogy of Asher, indicating merely the subdivisions of the clan, is furnished in Gen. xlvi. 17, and Num. xxvi. 44 (cf. 1 Chron. vii. 30). But little is known of the clan, which plays scarcely any part in Hebrew history. Asher takes no part in the uprising against Sisera (Judg. v. 17), while the statement (Judg. vi. 35 and vii. 23) that Asher participated in the conflict with Midian is open to question. The position of the tribe is also difficult to ascertain, since but few of the places mentioned (Josh. xix. 24–31) as belonging to Asher have been identified. There are indications that the tribe was originally settled in southern Palestine, where it became mixed with non-Hebrew clans, and subsequently moved northward toward the seacoast, though neither Accho, Achzib, nor Sidon (mentioned Josh. xix, as cities of Asher) could ever have belonged to it. The popular etymology as 'happy' (Gen. xxx. 13) may furnish the real meaning, and it is also possible that Asher may have originally been the name of a deity. In that case it may ultimately prove to be identical with Assur (q.v.) since the name of this god was written in early times Ashir, or Asir, both in Assyria and in Cappadocia. Ashera would then be the consort of this deity. A district or state of Aser in northwestern Galilee is mentioned in Egyptian inscriptions of the time of Seti I (c.1331–10 B.C.) and Rameses II (c.1310–1244 B.C.). See Max Müller, *Asien und Europa,* pp. 236 ff. (1893).

**ASH'ERA.** 1. A wooden post used in worship at the sanctuaries of Palestine in ancient times. It was employed not only by the Canaanites, but also by the Israelites at Samaria, Bethel, and Jerusalem (2 Kings xxiii. 6), in connection with the worship of Yahwe. It probably had phallic shape, represented a god or goddess of

fertility, and stood at the boundary of a field and especially a sacred inclosure. In Assyrian, *Asirtu* also has the meaning of 'sacred precincts,' and this is its manifest sense in the Phœnician Masud inscription. There was a strong prophetic opposition to this cultus-object, and many *asheras* were hewed down by Josiah after 620 B.C. 2. Ashera was also the name of a goddess. She was in all probability the wife of Assur (q.v.), or Asir, as the name of the chief Assyrian deity is written in early inscriptions found at Kalat Sherkat and at Kara Eyuk. Asirtu, or Asratu, also seems to have been identified with Ishtar (q.v.), and is sometimes represented as the consort of Amurru. (See AMORITES.) An Abdashirta, 'servant of Ashera,' flourished in Syria in the days of Amenhotep III (1411–1375 B.C.). Katabanian inscriptions show that this goddess was worshiped in south Arabia. Athirat is the consort of Wadd, the god of love. It is natural to infer that there was some connection between the goddess Ashera and the sacred pole. Consult Sayce, "Cappadocian Cuneiform Tablets from Kara Eyuk" in *Babyloniaca*, vol. vi, p. 68 (1911).

**ASH'ES.** The substance of all plants and animals contains as an indispensable ingredient a certain amount of mineral matter which remains behind as ash when the organic portion of the substance is burned.

According to Warington, the proportion of ash varies from 0.2 to 0.4 per cent in the dry matter of the wood of trees, from 2 to 5 per cent in seeds, from 4 to 7 per cent in the straw of cereals, from 4 to 8 per cent in roots and tubers, from 5 to 9 per cent in hay, and from 10 to 25 per cent in leaves of root crops. Lawes and Gilbert found that the proportion of ash varied from 4 to 5 per cent in cattle, from 2.8 to 3.5 per cent in sheep, and from 1.8 to 3 per cent in swine.

**Uses.** The ashes of sea plants were formerly a common source of bromine and iodine, and the ashes of animal bodies form a source of phosphorus. But the commercial value of ashes depends mainly on their use (1) as a source of alkali (pearl-ash, potashes, etc.), and (2) as a fertilizer. The fertilizing value of ashes is due to the fact that they contain all of the mineral constituents required by plants, especially potash, and that largely in one of the most desirable forms—viz., as carbonate. The following are the most important classes of ashes for agricultural purposes: (1) wood ashes from household fires, furnaces, etc.; (2) cotton-hull ashes, resulting from the use of cotton hulls as fuel under boilers, etc.; and (3) lime-kiln ashes, which are a mixture of more or less lime with the ashes of the fuel used in the kilns.

**Wood Ashes.** Wood ashes were formerly the almost exclusive source of potash for fertilizing and other purposes. They have, however, been very largely replaced by the German potash salts. The supply of wood ashes is limited on account of the general substitution of coal for wood as fuel. Canada is the main commercial source of supply in America. There the ashes are collected from house to house and stored in so-called "asheries." When first collected, they are said to weigh from 34 to 40 pounds per bushel; but when stored they undergo a heating and sweating process which causes them to shrink about one-fifth in bulk, the weight per bushel increasing from 40 to 48 pounds. It requires about 30 cords of hard wood to make one ton of ashes.

The composition of wood ashes is very variable. The hard woods yield ashes richer in potash than the soft woods. Pure ashes carefully prepared from hard woods have been found to contain more than 17 per cent of potash; those from soft woods almost 10 per cent, besides about 2 per cent of phosphoric acid. No such ashes are found on the market. Unleached ashes contain, on an average, about 5 per cent of potash, 1.5 per cent of phosphoric acid, and 30–35 per cent of lime. The fertilizing action of ashes is mainly but not entirely due to the potash. The small amount of phosphoric acid which they contain is not without fertilizing value, and the lime, which is present to the extent of 600 to 700 pounds per ton (of 2000 pounds), is of great value in improving the texture and in correcting the acidity of soils, besides supplying an element which is deficient in many soils.

Ashes which have been subjected to leaching show a reduced percentage of potash and an increased percentage of moisture. The average composition of such ashes is as follows: Moisture, 30 per cent; potash, 1.3 per cent; phosphoric acid, 1.5 per cent; lime, 28 per cent. The fertilizing action of leached ashes is due very largely to their favorable physical effects on the soil, which are brought about mainly by the lime present.

**Cotton-Hull Ashes.** Cotton-hull ashes are much richer in fertilizing constituents than wood ashes and are highly esteemed, especially in New England, as a fertilizer for tobacco. They contain on an average about 23 per cent of potash, 9 per cent of phosphoric acid, and 8.8 per cent of lime, although their quality varies greatly. The potash has been found to vary from 10 to 42 per cent, the phosphoric acid from 3 to 13 per cent. The high percentage of phosphoric acid which these ashes contain makes them a valuable source of this fertilizing constituent. The percentage of lime is too small to exert any marked influence on the fertilizing effect.

**Lime-Kiln Ashes.** These are obtained in the burning of lime with wood and usually contain less than 1.5 per cent of potash, about 1 per cent of phosphoric acid, and 45 to 50 per cent of lime. The low percentage of potash and phosphoric acid, and high percentage of lime, are due to admixture of lime from the kiln. Such ashes are valuable mainly for their lime.

**Other Kinds of Ashes.** Among other kinds of ashes which occasionally attain some agricultural importance are tan-bark ashes, which, according to Voorhees, seldom contain more than 2 per cent of potash, 1.5 per cent of phosphoric acid, and 33 per cent of lime; coal ashes, which contain only traces of phosphoric acid and soluble potash and are useful only for improving the physical condition of heavy soils; and seaweed ashes, which are very variable in composition on account of imperfect incineration or admixture of impurities, but are often quite rich in potash, as has been shown especially in the case of the kelps of the Pacific coast of the United States.

**ASHEVILLE,** ăsh'vĭl. A city and the county-seat of Buncombe Co., N. C., 129 miles by rail southeast of Knoxville, Tenn.; at the junction of the Swannanoa and the French Broad rivers, and on the Southern Railway (Map: North Carolina, B 4). It is finely situated, at an elevation of 2300 feet in a mountainous region, and is a celebrated health resort, both summer and winter. The city contains a public

library, Asheville Normal and Collegiate Institute, Bingham Military School, Asheville School for Boys, Home Industrial School, and other educational institutions. The post office, United States government building, county courthouse, city hall, public library, auditorium, Grove Park Inn, The Manor, Battery Park Hotel, and Winyah Sanitarium are notable features, and additional places of interest are Overlook Park, Richmond Hill, Beaumont (grounds), and Swannanoa Drive along the river bank. Adjoining the city is the Vanderbilt estate, Biltmore, whose forest preserves (132,000 acres) are now government property. Asheville is in a region which has considerable mineral wealth and valuable timber, and is especially adapted to stock raising, dairying, and general agriculture, as well as truck gardening, poultry raising, and fruit growing. Its apples are of a particularly fine variety. The manufactured articles include caskets, wood novelties, brick, cotton goods, mattresses, harness, cereals, furniture, mica products, building material, and tanned leather. City water comes from the Craggy and Black mountains. The French Broad River supplies hydroelectric power. Settled in 1792, Asheville was first incorporated about 1835. The government, under a revised charter of 1901, was vested in a mayor, biennially elected; a city council, chosen by wards and on a general ticket; and subordinate officials, who were nominated and elected by the council. In 1915 Asheville adopted the commission plan of government. Pop., 1890, 10,235; 1900, 14,694; 1910, 18,762; 1920, 28,504.

**ASH FLY.** A gall fly of the oak (*Cynips quercifolii*). See GALL INSECTS.

**ASH'FORD.** A market town of Kent, England, situated on the Stour, 56 miles by rail southeast of London (Map: England, G 5). It is well built and lighted and has an excellent water supply. The town maintains public baths, a park, hospital, and technical schools. It manufactures linen goods, agricultural implements, beer, and pianos, and has a large workshop of the Southeastern Railway. Pop., 1891, 10,700; 1901, 12,800; 1911, 13,668. Ashford was the home of Jack Cade.

**ASHFORD,** BAILEY KELLY (1873—). An American surgeon, born in Washington, D. C. His general education was obtained at the public schools and at Columbian (now George Washington) University. In 1896 he graduated from the Georgetown University Medical School and in 1898 from the Army Medical School, during this period serving also as resident physician in several hospitals. Having accompanied the military expedition to Porto Rico in 1898, he made during the next year an exhaustive study of anæmia in that island, and determined that the hookworm responsible for this disease caused as many as 12,000 deaths a year. The governmental campaign against the plague, organized by him and prosecuted in 1903–04, resulted in the treatment and cure of some 300,000 persons out of a total population of a million, and in a reduction of 90 per cent in the death rate from anæmia. Ashford founded the Porto Rico Anæmia Commission and by special authority of the Secretary of War served on it in 1904–06. He was also made chairman of the consulting staff of the Presbyterian Hospital in San Juan, Porto Rico, and was chosen to membership in many American and foreign medical societies. His writings include *Anæmia in Porto Rico* (1904); *Uncinariasis in Porto Rico: A Medical and Economic Problem* (1911).

**ASH'HURST,** JOHN, JR. (1839–1900). An American surgeon. He was born at Philadelphia, graduated in 1857 at the University of Pennsylvania; studied medicine, and from 1862 to 1865 was assistant surgeon in the United States army. He was appointed professor of clinical surgery in the University of Pennsylvania in 1877, Barton professor of surgery in 1883, and president of the Philadelphia College of Physicians in 1898. He was a member of several scientific societies and edited Erichsen's *Science and Art of Surgery* (1869) and the *International Encyclopædia of Surgery* (6 vols., rev. ed., 1888). His original publications include *Injuries of the Spine* (1867) and *Principles and Practice of Surgery* (1871; 6th ed., 1901).

**ASHI,** äsh'ī, RABBI (352–427 A.D.). A son of Simai and member of a well-known family. Nothing is known of his childhood or education, but at an early age he became the head of the Rabbinical school at Sura in Babylonia. He is said to have rebuilt the schoolhouse at that place, and such was the distinction which he gained among his contemporaries that he was accorded the honorable title "Rabbana," i.e., 'our teacher.' His chief claim to fame rests upon the attempt that he made to gather the discussions of the Rabbis on the Mishnah into a compilation known as the "Gemara," which, together with the Mishnah, constitutes the Talmud. He worked at this task for more than 50 years, but it was left for his successors to complete it. See TALMUD.

**ASHIKAGA,** ä'shē-kä'gä. A town of Japan in the prefecture of Tochigi, situated in the southern part of Honshiu, 71 miles by the Riomo Railway north-northwest of Tokio (Map: Japan, F 5). The town was famous for its academy of Chinese learning said to have been founded in the ninth century. It contained an extensive library of Chinese works and was one of the most famous centres of Chinese culture and Confucianism. With the establishment of the Seido at Yolo, at the end of the seventeenth century, it lost its former importance and at present retains only a fraction of its library and an image of Confucius. Commercially Ashikaga is important for its extensive trade in cotton and silk goods. Pop. (latest report), 1898, 21,348.

**ASHIKAGA.** A dynasty of Shoguns or military lieutenants of the Mikado, who ruled Japan from 1336 to 1574, the last being overthrown by Ota Nobunaga. See SHOGUN.

**ASHIO,** ä-shē'ō. A town of Japan, situated in the southern part of Honshiu, 10½ miles southwest of Nikko. Silver is mined in the vicinity, and it is famous for the two copper mines of Ashio and Kotaki, 2 miles distant, considered the most productive in Japan. In 1910 the output of copper ore was about 300,000 tons. In the vicinity of the town are situated extensive smelting works run by electricity generated by water power. Pop., about 6000.

**ASH'KELON** (Gk. *Ἀσκάλων, Askalōn*; Heb. *Ashkelon*; Ass. *Askaluna*; modern *Askalān*). An important Syrian city in ancient times, now in ruins. It is situated on the shores of the Mediterranean, north of Gaza, and about 40 miles west-southwest of Jerusalem. Before the Philistine invasion it was occupied by the Avvites (Deut. ii. 23). In the beginning of the

fourteenth century B.C. the city was ruled by an Egyptian governor, Yitia, from whom we have three letters to Amenhotep IV in the Amarna correspondence. Ashkelon rebelled against Egypt in the reigns of Rameses II (1310–1244) and Merenptah (1244–1234). The latter refers to Ashkelon in his famous inscription mentioning Israel. (See ISRAEL.) The city passed into the hands of the Philistines when these invaders from Crete were driven from Egypt into Syria by Rameses III (c.1200 B.C.). It is mentioned as a Philistine city in the story of Samson (Judg. xiv. 19); it is one of the cities in which the captured ark of Yahwe was kept (1 Sam. vi. 17); and it is referred to by David in his elegy over Saul and Jonathan (2 Sam. i. 20). In the second half of the eighth century there were two parties in Ashkelon, as in other city kingdoms in Syria—one favorable to the Assyrians, and another striving for independence. Tiglath-pileser IV seems to have made Mitinti a vassal in 738; this King died in 733, and his son, Rukipti, was placed upon the throne by the Assyrian monarch. Sar-ludari, the son of Rukipti, was faithful to Assyria, but was driven away by Sidka. Sennacherib, in 701, brought him captive to Assyria and restored Sar-ludari. It became a part of the Achæmenian Empire and was conquered by Alexander. Under Ptolemaic and Seleucid rule it became a thoroughly Hellenistic city. The worship of its goddess Atargatis-Derketo continued, however, though temporarily checked by the Hasmonæan rulers, Jonathan and Alexander Jannæus, who held possession of the city (1 Maccabees x. 86; xi. 60). Its regained independence was marked by the city era of 104 B.C. Herod's family probably came from Ashkelon, and he embellished the city with baths, palaces, and fountains. All through the Hellenistic period it seems to have enjoyed great prosperity and was a centre of learning. It was the birthplace of philosophers like Antiochus and Eubius, grammarians like Ptolemy and Dorotheus, and historians like Apollonius and Artemidorus. The citizens were strongly opposed to Christianity down to a late period. After being captured by the Moslems, Ashkelon remained in their possession until it was taken by the Crusaders. Under the walls of the city the Christians won a brilliant victory on Aug. 12, 1099; but the city did not fall into their hands until 1154 after a siege by sea and land of five months. It was taken by Saladin in 1187 and dismantled in the beginning of the third Crusade. The attempt by Richard Cœur de Lion in 1191 to rebuild the walls had to be abandoned, and it was agreed that the city should remain unfortified. The final destruction came in 1270 through Sultan Bibars, who had the harbor filled with rocks. The ruins of the massive city walls still stand, and to the east between them and Mejdel some remains of the temple of Derketo. Consult: Guérin, *Judée*, vol. ii, pp. 153 ff. (1869); Winckler, *Geschichte Israels*, pp. 221 ff. (1895); Strack, *Gaza und die philistäische Küste* (1852); Schürer, *Geschichte des jüdischen Volkes* (4th ed., 1901).

**ASH'KENA'ZIM.** Already in the writings of Saadia (892–942) Ashkenaz seems to be used as a name of Germany. This interpretation may indeed be earlier, as Ashkenaz, Riphat, and Togarmah are explained as *Germanikiye*, or Germans, in *Bereshith Rabba*, xxxvii, 1. Since the twelfth century, at any rate, the Jews of Germany have been called Ashkenazim, and they as well as the Jews of other regions in which German Jews have settled are designated as Ashkenazim, as against the Sephardim —the so-called Portuguese Jews, the descendants of the Jews of Spain and Portugal. The difference between the two consists merely in a different pronunciation of the Hebrew, and slight divergences in the ritual. Doctrinally there is no difference. At times, however, social distinctions have been very great and intermarriage almost impossible.

**ASHLAND.** A city in Boyd Co., Ky., 146 miles east by south of Cincinnati, Ohio, on the Chesapeake and Ohio and the Norfolk and Western railroads, and on the Ohio and Big Sandy rivers (Map: Kentucky, H 2). The principal features of interest are Central Park, a public preserve of about 50 acres in the centre of the city, and Clyffeside Park, a summer resort with various attractions, maintained by a corporation, just outside the city limits. Ashland is important chiefly as a manufacturing city, though it carries on an extensive trade in coke, iron ore, and the varied products of its industrial plants, which include pig iron, cut and wire nails, wire rods, steel billets, sheet steel, fire brick, leather, cement, coke ovens, flour, ice, furniture stock, and oak and poplar lumber. Settled in 1854, Ashland was chartered as a city in 1870. Under a revised charter of 1894 the government is vested in a mayor, elected every four years, and a city council which chooses all municipal officials except the board of education and chief of police. Pop., 1900, 6800; 1910, 8688; 1920, 14,729.

**ASHLAND.** A city and the county-seat of Ashland Co., Ohio, 55 miles (direct) southwest of Cleveland, on the Erie and the Loraine, Ashland, and Southern railroads, and the Cleveland, Southwestern and Columbus electric line (Map: Ohio, F 4). It has a public library, the Samaritan Hospital, and manufactures stock and poultry foods, pumps, hay, tools, rubber goods, etc. The water works are owned by the municipality. Pop., 1900, 4087; 1910, 6795.

**ASHLAND.** A city in Jackson Co., Ore., 341 miles south of Portland, on the Southern Pacific Railroad (Map: Oregon, C 5). Ashland is the seat of a State normal school, a polytechnic and business college, the southern Oregon Chautauqua, and has a Carnegie library and a hospital. Because of its pleasant location in the Rogue River valley, and on account of the existence of hot and cold sulphur and other mineral springs, it is popular as a health resort. There are important fruit-growing, granite-quarrying, and lumber interests, and rich deposits of gold, copper, iron, and coal. The city also contains railroad shops, planing mills, a broom factory, iron foundry, and a creamery. The water works and electric light plant are owned by the municipality. Pop., 1890, 1784; 1900, 2634; 1910, 5020.

**ASHLAND.** A borough of Schuylkill Co., Pa., 12 miles (direct) northwest of Pottsville, on the Philadelphia and Reading, and Lehigh Valley railroads (Map: Pennsylvania, J 5). Coal mining is the chief industry, but there are also important foundries, machine shops, etc. Ashland owns and operates its water works. Settled in 1850, Ashland was incorporated in 1857. Its charter of that date provides for a mayor elected every three years and a city council of 15 members. Pop., 1900, 6438; 1910, 6855.

**ASHLAND.** A residential town in Hanover

Co., Va., 17 miles by rail north of Richmond, on the Richmond, Fredericksburg, and Potomac Railroad (Map: Virginia, G 4). It is the seat of Randolph-Macon College (Methodist Episcopal, South), founded in 1832, in Mecklenburg County, and removed to Ashland in 1866. Settled in 1845, Ashland was incorporated in 1856. The town suffered from a number of raids during the Civil War, and the locality was the scene of several battles. The town carries on a considerable trade in garden produce. Henry Clay was born about 7 miles from Ashland. Pop., 1890, 948; 1900, 1147; 1910, 1324.

**ASHLAND.** A city and the county-seat of Ashland Co., Wis., 70 miles east of Superior, on Chequamegon Bay, and one of the finest harbors on Lake Superior (Map: Wisconsin, C 2). Steamers connect it with lake ports, and it is on the Minneapolis, St. Paul, and Sault Ste. Marie, the Northern Pacific, and the Chicago and Northwestern railroads. Ashland is the seat of Northland College, the Sacred Heart Convent, and contains a hospital, the Vaughn Public Library, North Wisconsin Academy, an opera house, a fine United States government building and post office, and Knight Hotel. The Apostle Islands, in Chequamegon Bay, are of historic and scenic interest. Industrial and commercial interests are represented by several lumber mills, charcoal blast furnaces, steel plant, foundries and machine shops (including railroad shops of the Chicago and Northwestern), pulp works, creameries, flour mill, brownstone quarries, large wholesale houses, and extensive ore and merchandise docks. An extensive industry in dairying and fruit growing has been developed. Ashland is one of the most important ports on the Great Lakes, the place from which the product of the iron mines of the Gogebic Range is shipped. Settled in 1854, Ashland was incorporated in 1863, and since 1876 has grown rapidly. It was chartered as a city in 1887 and adopted the commission form of government in 1913. Pop., 1900, 13,074; 1910, 11,594; 1920, 11,334.

**ASH'LAR.** See MASONRY.

**ASH'-LEAVED MA'PLE.** See BOX ELDER.

**ASHLEY.** A borough in Luzerne Co., Pa., 1 mile from Wilkes-Barre, on the Central of New Jersey and the Wilkes-Barre and Hazleton railroads. It is in a productive coal-mining region and has railroad shops. Pop., 1900, 4046; 1910, 5601.

**ASH'LEY,** ANTHONY EVELYN MELBOURNE (1836–1907). An English statesman of the Liberal party, fourth son of the seventh Earl of Shaftesbury. After his graduation at Trinity College, Cambridge, he was called to the bar at Lincoln's Inn and joined the Oxford Circuit. He was private secretary to Lord Palmerston from 1858 to 1865, barrister of the Oxford Circuit from 1865 to 1874, and Parliamentary Secretary to the Board of Trade from 1880 to 1882. Mr. Gladstone selected him (in 1882) to succeed Mr. Courtney as Under Secretary of State for the Colonies. He was also member of Parliament from 1874 to 1885, when he was defeated in the Isle of Wight contest. In 1891 he was made a Privy Councilor. He wrote *The Life of Henry John Temple, Viscount Palmerston* (London, 1879).

**ASHLEY,** WILLIAM JAMES (1860–1927). An Anglo-American educator. He was born in London, England, graduated at Balliol College, Oxford, in 1881, was a lecturer in history at Lincoln and Corpus Christi in 1885–88, professor of constitutional history and political economy at the University of Toronto in 1888–92, and professor of economic history at Harvard in 1892–1901, when he became professor of commerce and finance, and then dean of the faculty of commerce, in the University of Birmingham, England. He translated for the "Economic Classics" series, of which he was editor, Schmoller's *Mercantile System* (1896) and Turgot's *Reflections* (1898), and wrote *James and Philip van Artevelde* (1883); *An Introduction to English Economic History and Theory* (1888–93); *Surveys, Historic and Economic* (1900); *The Tariff Problem* (3d ed., 1911) and *The Adjustment of Wages* (1903), and *Progress of the German Working Classes* (1904). He edited *British Industries* (1907), *British Dominions: Their Present Commercial and Industrial Condition* (1911), *Birmingham Studies in Social Economics* (1912), and wrote *Gold and Prices* (1912).

**ASH'LEY COOP'ER,** ANTHONY. See SHAFTESBURY, EARLS OF.

**ASH'MEAD-BART'LETT,** Sir ELLIS (1849–1902). An English statesman. He was born in Brooklyn, N. Y., the eldest son of Ellis Bartlett, a minister of Plymouth, Mass., and of Sophia, daughter of J. K. Ashmead, of Philadelphia. He received his education at Torquay and at Christ Church, Oxford, where he was president of the Oxford Union. He graduated with high honors and was called to the bar at the Inner Temple in 1877. He was member of Parliament from 1880 to 1885, in 1886, 1892, and 1895, and Civil Lord of the Admiralty from 1885 to 1886 and from 1886 to 1892. He served in South Africa in 1900 and in the Græco-Turkish War of 1897, when he was taken prisoner by a Greek warship, the commander of which mistook him for a spy. He was knighted in 1892. He was a frequent speaker in the House, especially on foreign questions, and published: *The Battlefields of Thessaly* (1897); *The Passing of the Shereefian Empire* (new ed., 1910); *With the Turks in Thrace* (new ed., 1913).

**ASH'MOLE,** ELIAS (1617–92). An English antiquary, founder of the Ashmolean Museum, at Oxford University. He was born at Lichfield and became a lawyer. In the Civil War he favored the royalist side and held a commission in the army. About this time he became interested in the study of astrology and alchemy and entered Brasenose College, Oxford, to study these subjects, together with physics and mathematics. He was one of the earliest of English Freemasons, having been initiated about 1646. With the Restoration Ashmole received many court offices and honors. His later interests were almost entirely in antiquarian subjects. He received by bequest the collection of curiosities of John Tradescant, and with his own additions it was turned over to Oxford University in 1682. He was the author of *Theatrum Chemicum* (1652), a collection of ancient metrical treatises on alchemy; *Institution, Laws, and Ceremonies of the Order of the Garter* (1672); *The Antiquities of Berkshire* (3 vols., 1719), and his *Diary* (1717).

**ASHMO'LEAN MUSE'UM.** A museum of antiquities at Oxford, founded by Elias Ashmole, and contained in a building erected by Christopher Wren in 1682. In the floor are some of the Arundel Marbles.

**ASH'MUN,** GEORGE (1804–70). An American lawyer and politician, born in Blandford, Mass.

He graduated at Yale in 1823 and was admitted to the bar in 1828; served for four terms in the Lower House of the Massachusetts Legislature, and for one term in the State Senate, and was an influential member of Congress from 1845 to 1851. In 1860 he presided over the convention at Chicago which nominated Lincoln for President.

**ASHMUN,** JEHUDI (1794–1828). An American missionary. He was born at Champlain, N. Y., graduated at the University of Vermont in 1816, and was elected a professor in Bangor Theological Seminary (Congregational). He soon resigned, joined the Episcopal church, and became editor at Washington of *The Theological Repertory*. In this periodical he advocated the views of the African Colonization Society for founding a colony of liberated negroes on the west coast of Africa. Soon he was appointed an agent of the Society, and in 1822 conducted a body of liberated negroes from Baltimore to Liberia. He devoted the next six years to the task of putting the colony on a solid basis, but was obliged to return to the United States and soon died. See his *Life*, by R. R. Gurley (New York, 1835).

**ASHOKAN RESERVOIR.** An artificial lake, about 14 miles west of Kingston, N. Y., formed by the Olive Bridge dam across Esopus Creek and the Beaver Kill and Hurley dikes across smaller streams and gaps between the hills. It has a water surface of 12.8 square miles and a capacity of 132,000,000,000 gallons. It is situated about 90 miles north of the city of New York and forms an important part of the Catskill water system, impounding the water of the Esopus watershed, which aggregates some 255 square miles. It is on the route of the Ulster and Delaware Railroad, which had to be re-located on account of the construction of the dams and reservoir. See AQUEDUCTS; DAMS AND RESERVOIRS.

**ASHRAF,** ä-shräf'. A town of Persia in the province of Mazanderan, situated near the coast of the Caspian, 50 miles west of Astrabad (Map: Persia, E 3). It was the favorite residence of Shah Abbas the Great, and the ruins of the palaces and gardens bear evidence of their former splendor. The proximity to the Caspian coast gives the town some commercial importance, and Ashraf carries on a considerable trade with Russia in cotton and silk goods. In its flourishing days it is supposed to have contained as many as 2000 families which have dwindled to about 800.

**ASH'TABU'LA.** A city in Ashtabula Co., Ohio, 55 miles east by north of Cleveland; on Ashtabula River; on Lake Erie; and on the Lake Shore and Michigan Southern, the New York, Chicago, and St. Louis, and the Pittsburgh, Youngstown, and Ashtabula railroads (Map: Ohio, J 2). It contains a public library and a hospital, and has bow socket, box, and hardware factories, tanneries, worsted mills, and manufactures of farm implements, carriages and automobiles, shale paving bricks, etc.; it does a large business in the shipment of coal and transshipment of iron ore, through the fine harbor at the river's mouth; and it has also a large dry dock and shipbuilding plant, and one of the largest areas of winter vegetables under glass of any city in the United States. The river has been straightened and dredged by the city, greatly improving manufacturing and transporting facilities of Ashtabula and country adjacent to the upper river. Ashtabula was first settled in 1803, and in 1808 was organized as a township, including within its limits what are now Kingsville, Sheffield, and Plymouth, separately incorporated in 1810, 1820, and 1838, respectively. The electric light plant is owned by the city. Pop., 1890, 8338; 1900, 12,949; 1910, 18,266; 1920, 22,082.

**ASH'TAROTH.** See ASTARTE.

**ASHTAROTH KAR'NAIM.** A city mentioned in Gen. xiv. 5. The name should probably be read Ashtart Karnaim, and means 'Ashtart of the two-peaked [mountain].' It is possibly the modern Tell-Ashtarah, on the Bashan Plateau, 21 miles east of the Lake of Galilee, though places named after the great goddess must have been quite numerous. Consult Moore, in *Journal of Biblical Literature*, vol. xv, pp. 155 ff. (1896).

**ASHTAR'TE.** See ASTARTE.

**ASH'TON,** ALGERNON BENNET LANGTON (1859—). A distinguished English composer. He was born at Durham, but received his musical education at the Conservatory at Leipzig from 1875 to 1879. After his graduation he took a special course in composition with Raff. In 1881 he returned to his native country and settled as a teacher in London. In 1885 he became professor of piano at the Royal College of Music. As a composer he cultivated with evident predilection the field of chamber music. His works include four symphonies, three overtures, two string quartets, a quintet for wind instruments, compositions for organ, choruses, songs, and numerous sonatas for piano solo, piano and violin, piano and 'cello, and also one sonata for piano and viola.

**ASHTON,** JOHN (1834—). An English literary antiquarian, born in London. His many publications include: *Social Life in the Reign of Queen Anne* (1882); *History of the Chapbooks of the Eighteenth Century* (1882); *English Caricature and Satire on Napoleon I* (1884); *A Century of Ballads* (1887); *Social England under the Regency* (1890); *Real Sailor Songs* (1891); *The Devil in Britain and America* (1896); *When William IV was King* (1896); *Gambling in England* (1898); *Florizel's Folly; Gossip in the First Decade of Victoria's Reign* (1903); *The History of Bread: From Prehistoric to Modern Times* (1904); *Dawn of the Nineteenth Century in England: A Social Sketch of the Times* (5th ed., 1906).

**ASHTON,** LUCY. The daughter of Lord and Lady Ashton, in Scott's *Bride of Lammermoor*, and the heroine of the novel. Forbidden by her parents to marry her lover, Ravenswood, she goes mad on her wedding night and dies.

**ASH'TON IN MAKERFIELD,** -māk'ẽr-fēld. A town in Lancashire, England, on the Central Railway, about 15 miles west of Manchester. Its chief industries are the manufacture of iron goods, cotton, and pottery, and there are numerous collieries. Pop., 1891, 13,400; 1901, 18,700; 1911, 21,543.

**ASH'TON-UN'DER-LYNE.** A busy manufacturing town of Lancashire, England, on the Tame, about 6 miles east of Manchester (Map: England, D 3). It is a parliamentary borough, returning one member to Parliament. The town is of Saxon origin and came into the possession of the Assheton family in 1336. It was incorporated in 1847. Its change from comparative insignificance to an important manufacturing centre dates from the introduction of the

cotton industry in 1769. Bleaching, dyeing, and calico printing, coal mining, and the manufacture of machines, hats, etc., furnish considerable employment to the people. Its facilities for communication are excellent, as it is situated on three railway lines, and connected by a canal with Manchester and other important towns. Ashton possesses several hospitals, a technical school, a library, and a fine park. Pop., 1891, 40,500; 1901, 43,900; 1911, 45,172.

**ASH'TORETH.** See ASTARTE.

**ASHUAPMOUCHOUAN,** ăsh-wäp'mo͞o-chwän'. See CHAMOUCHOUAN.

**ASHURADA,** ä'shoo-rä'dä. A small island in the southeastern part of the Caspian Sea, northwest of Astrabad (Map: Persia, E 3). The Russian government maintains here a naval station.

**ASHURST,** HENRY FOUNTAIN (1875—). An American public official and legislator, born at Winnemucca, Nev. His earlier education was obtained in the public schools of Flagstaff, Ariz., and at the Stockton (Cal.) Business College. A special course in law and political economy he took in 1903–04 at the University of Michigan. In 1896, shortly after his admission to the bar at Williams, Ariz., he was appointed a justice of the peace, and in the same year he was chosen a member of the Arizona Territorial House of Representatives. To this body he was reëlected in 1898 and by it was chosen Speaker. Following a term in the Territorial Senate he was made district attorney of Coconino County, serving from 1905 to 1908. In the latter year he was admitted to practice before the Supreme Court of the United States. On March 27, 1913, he was elected United States Senator by the unanimous vote of the first Legislative Assembly of the new State of Arizona, for the term ending 1917. See ARIZONA, *History*.

**ASH-WEDNESDAY.** The first day of Lent, so called from the Roman Catholic ceremony of strewing ashes on the head as a sign of penitence. This custom was sanctioned by Pope Celestin III in 1191, but dates from at least as early as the tenth century. The present custom in the Church of Rome on this day is this: After an introit and four collects, the priest puts the ashes, which are those made by burning the palms consecrated on the preceding Palm Sunday, on the head of each penitent kneeling at the altar rails, while he says in Latin: "Remember, man, that thou art dust, and shalt return to dust." The Protestant church in Germany does not celebrate Ash-Wednesday. In the Church of England and in the Protestant Episcopal church in the United States, it is observed, but without anything of the ceremony from which it derives its name; and the *commination* —a series of denunciations against impenitent offenders—along with penitential prayers, is appointed to be read in the service for this day in the English church; but in the American church only the penitential prayers.

**ASIA,** ā'shă *or* ā'zhă. The largest and most easterly part of the Old World. Europe extends west from the northwestern part of Asia, something like a great peninsula. With an area of 17,250,000 square miles, Asia covers more than one-eleventh of the entire surface of the globe and more than a third of the entire land surface. A straight line from its most western point at Baba Kalessi, on the Ægean Sea, to its most eastern point at Cape Deshnef (East Cape), Bering Sea, has a length of 6820 miles. Its greatest breadth is measured from Cape Chelyuskin, on the Arctic Ocean, to Cape Buru, at the south end of the Malay Peninsula, 5270 miles. Among the three northern continents, Asia extends farthest to the north and to the south, and the extreme northern and southern points lie almost under the same meridian. The time distance between the most western and eastern points is 11 hours. The ninetieth meridian of east longitude may be regarded as the central meridian, and the fortieth parallel of north latitude as the central parallel of the continent. These lines of orientation cut one another near Lob Nor, in eastern Turkestan. This enormous continental mass, with the exception of a territory in the extreme northeast, about as large as the area of England, lies in the northern division of the Eastern Hemisphere, while its islands extend on the southeast across the Equator. On three sides it is surrounded by the ocean, but on the west it joins Europe, the line of separation between them being accepted as the Ural Mountains, an irregular line from their south end to the north end of the Caspian Sea, thence the Caucasus Range to the Black Sea. The population of Asia was estimated (1908) at 918,324,000.

By the Isthmus of Suez Asia has a connection with Africa, from which it is separated by the narrow Red Sea, occupying a rift valley of comparatively recent formation. The continent has an average elevation above the sea of over 3000 feet. The coast line is about 33,000 miles in length, and on the south and east is greatly diversified by seas, bays, and gulfs, affording advantages to navigation and commerce far superior to those of Africa and South America, but inferior to those possessed by Europe and North America. The indented and broken northern coast is, to some extent, available for navigation in the summer months from Waigat Strait, south of Nova Zembla, to the Obi and Yenisei rivers; and in 1912 and 1913 Russian survey vessels steamed along the northern coast from Bering Strait to Cape Chelyuskin; but the whole north coast is icebound most of the year.

Asia is bounded northward by the Arctic Ocean, into which its continental shelf, covered to depths of only 600 feet, penetrates far to the north, eastward by the Pacific Ocean, southward by the Indian Ocean, and westward by Europe, the Caspian Sea, the Black Sea, the Mediterranean, and the Red Sea. On the extreme northeast it is separated from North America only by the narrow Bering Strait, about 40 miles wide. On the southeast the vast eastern archipelago, comprising numerous great islands, Luzon and Mindanao in the Philippines, Sumatra, Borneo, Java, Celebes, New Guinea, and hundreds of smaller ones, extends almost to Australia. The body of the continent may be regarded as a trapezium, of which the projections, consisting of several large peninsulas, bear some resemblance to those of Europe, though in Asia everything is on a greater scale. On the west is the peninsula of Asia Minor, or Anatolia, separated from Europe by the Bosporus, the Sea of Marmora, and the Dardanelles, with the Black Sea on the north, the Ægean Sea on the west, and the Levant (the easternmost part of the Mediterranean) on the south. On the south of Asia Arabia may be considered as a counterpart of the Iberian Peninsula; Italy, with its neighboring island, Sicily, is rep-

resented by India and Ceylon; and as the broken Grecian Peninsula in Europe has numerous islands extending toward Asia on the southeast, so in Asia the Malay Peninsula has an island connection with Australia on the southeast by means of the Eastern Archipelago. The eastern coast of Asia is characterized by the deep indentations made by the Pacific Ocean, forming the South China Sea on the southeast, and the Yellow, East China, Japan, Okhotsk, and Bering seas on the east, all island-bound, and separated from the Pacific respectively by the Philippines, the Liu-Kiu Islands, Korea, Japan, and Kamchatka. On the north the Siberian coasts are also deeply indented, but rather by the embouchures of large rivers than by arms of the sea.

**Topography.** The relief features of this continent are characterized by great extremes and by an unparalleled variety; it has the most extensive lowlands, the greatest tablelands, the highest chains of mountains, and the most elevated summits in the world. Tracts doomed to everlasting snow and scorching sterility, salubrious valleys of continual verdure, and noisome jungles of the rankest growth are found within its limits.

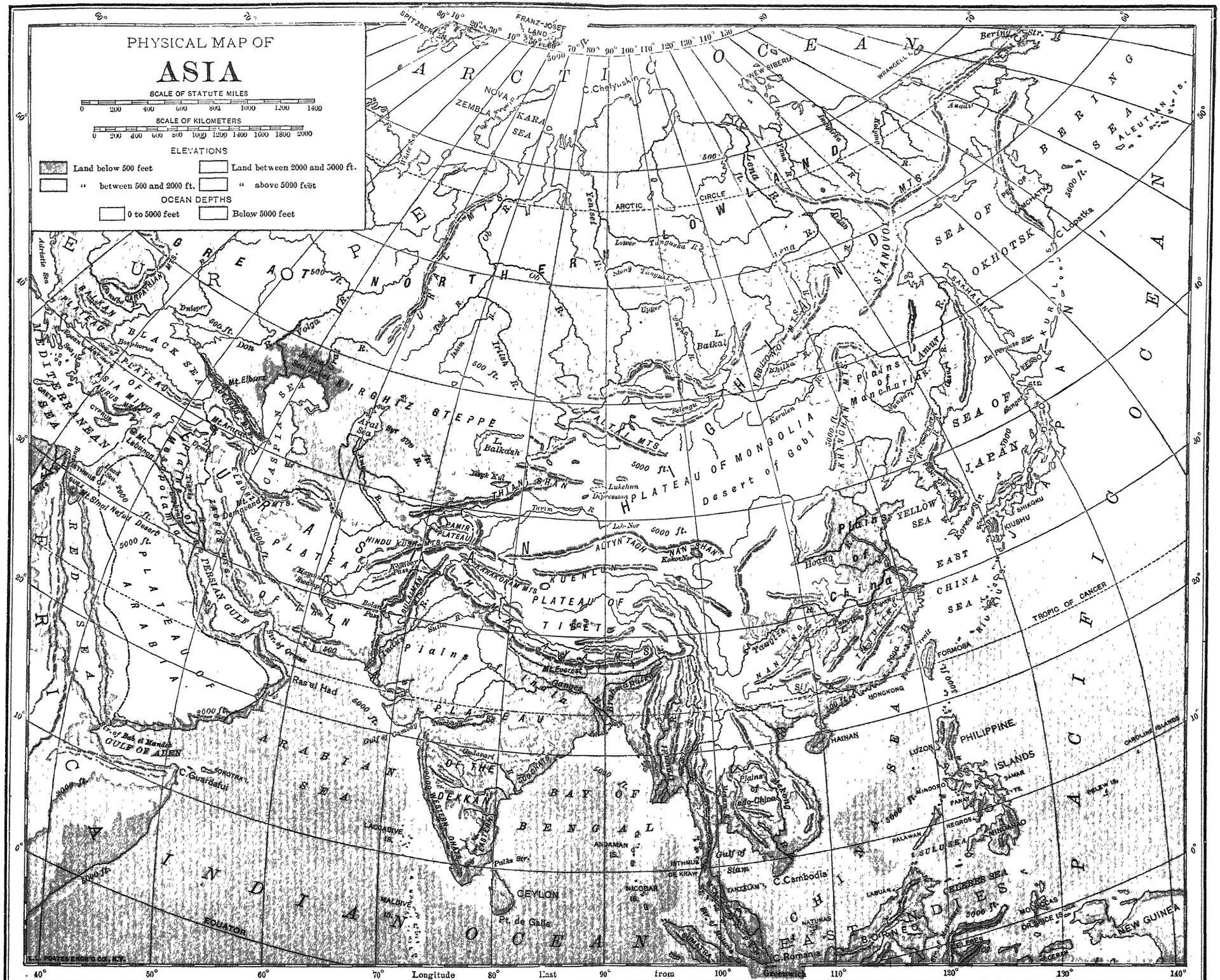
Where India, Turkestan, and Afghanistan meet is an elevated region known as the Pamir, and to its inhabitants as the "roof of the world." It is of great height, even the valleys exceeding 11,000 feet in altitude above the sea, while the mountains are several thousand feet higher. From this region as a centre, mountain systems and ranges radiate in various directions, but mainly eastward and westward, inclosing between them elevated plateau-like areas. These mountain systems, with the inclosed plateaus, form the broad backbone of Asia, running with a widely differing breadth, nearly east and west across the continent. It is widest in the east, where it stretches from the Indo-China Peninsula across western China and Manchuria to southeastern Siberia, extending from lat. 20° to 50° N.; it narrows in the Pamir, and broadens again westward to include most of Afghanistan and much of Baluchistan, Persia, and Asia Minor. From the mountain knot of the Pamir stretches a mountain system, bordering the northern margin of the main plateau. The ranges comprising the system are somewhat broken and disconnected, and many of them arranged *en échelon*. They extend, under various names, to the coast of the Sea of Okhotsk and thence along the coast to Bering Strait. North of them lies Siberia, a great plain with a breadth of 130° of longitude, sloping gently over 25° of latitude to the Arctic Ocean.

East of the Pamir the great plateau is limited on the south by the Himalayas, while between this great range and the northern system are many other ranges traversing it. This tableland contains the plateau of Tibet and the vast elevated expanse of Han-hai, which includes the desert of Gobi or Shamo, and the Takla Makan Desert. The plateau of Tibet lies directly north of the Himalayas, and is limited on the north by the Kuenlun, Altyn Tagh, and Nanshan ranges, and on the east by the broken mountainous country in the west of China. Its surface is a plain, diversified by many mountain ranges, trending generally east and west. It is the most elevated plateau on earth, its western part ranging in height from 14,000 to 17,000 feet, sloping eastward down to 9000 feet. It is a bleak, arid region, and its few inhabitants are occupied mainly in pastoral pursuits. The great plateau of Han-hai, which lies north and northeast of Tibet, is limited on the north by the succession of ranges which commence with the Tian Shan and are followed by the Ala-tau, Altai, Tan-nu, Sayan, Yablonoi, and Stanovoi ranges, and extend northeastward to the Sea of Okhotsk and Bering Strait; and on the east by the Khingan Mountains, mainly comprised in Mongolia. Its otherwise level surface is intersected by many mountain groups and has an elevation of 3000 to 4000 feet.

On the south the plateau region is separated from the plains of Hindustan by the Himalaya Mountains, many of whose summits rise from 25,000 to 29,000 feet above the level of the sea. Even the passes over this enormous range are almost as high as the summit of Mont Blanc. Here Dhaulagiri, in Nepal, long supposed to be the Mont Blanc of the Himalayas, rises to 26,800 feet, leaving all the peaks of the Andes far below, while $K^2$ rises to 28,250 feet, Kinchinjunga reaches nearly that altitude, and Mount Everest, now believed to be the loftiest summit on earth, attains the height of 29,000 feet.

From the Pamir stretches westward a great succession of mountain ranges, which, beginning with the Hindu Kush (which attains a height of 25,000 feet), and prolonged westward by the Paropamisus in Afghanistan, by the Elburz in northern Persia, with Demavend (about 18,500 feet), by the mountains of Armenia (culminating in Mount Ararat), and by the Taurus Range and other mountains of Asia Minor, forms a fairly continuous line of ranges to the shore of the Ægean Sea. North of it, in Russian Central Asia, is a depressed area, in some places below sea level, which is drained into the Aral and Caspian seas. The great plateau of which these ranges form the backbone consists of three sections. To the south of the Elburz Range and the Paropamisus is the great plateau of Iran, in Persia, Afghanistan, and Baluchistan. West of this is the Median-Armenian Alpine region, some of whose plateaus are at elevations of over 6000 feet. Beyond this the plateau formation extends westward in the Anatolian tableland. The western plateau of Asia, thus divided into three sections, is full of diversities of soil and scenery. A great part of the tableland of Iran is extremely barren and arid, which serves to explain the enthusiastic terms in which the Persian poets have spoken of the beautiful valleys found here and there among the mountains. The coasts of the Persian Gulf are sandy wastes. A great part of Baluchistan also is an arid plain, covered with red sand.

Besides these central elevated land masses, there are many detached mountain chains and plateaus. The Ural Mountains, forming in part the land boundary between Europe and Asia, are divided into three sections—the northern, central, and southern Ural. The second of these divisions is rich in minerals, gold, platinum, magnetic iron, and copper. On the isthmus between the Black Sea and the Caspian the Alpine ridges of the Caucasus reach a height of 10,000 to 11,000 feet, while individual peaks tower up to 17,000 and 18,000 feet, as in the still faintly volcanic peak of Elbruz, 18,500 feet, and Kasbek, 16,500 feet; both of these peaks are, however, on the northern or European side of the main mass of the Caucasus. The highlands of Syria rise gradually from the neighboring deserts in the


PHYSICAL MAP OF
ASIA
SCALE OF STATUTE MILES
0 200 400 600 800 1000 1200 1400
SCALE OF KILOMETERS
0 200 400 600 800 1000 1200 1400 1600 1800 2000
ELEVATIONS
Land below 500 feet
Land between 500 and 2000 ft.
" between 2000 and 5000 ft.
" above 5000 feet
OCEAN DEPTHS
0 to 5000 feet
Below 5000 feet
ARCTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
EUROPEAN PLATEAU
NORTHERN LOWLANDS
PLATEAU OF MONGOLIA
Desert of Gobi
PLATEAU OF TIBET
ASIA MINOR PLATEAU
ARABIAN PLATEAU
DEKKAN PLATEAU
Plains of India
Plains of China
Plains of Manchuria
Plains of Indo-China
Mts. of Further India
Mts. of Eastern Asia
Mts. of Western Asia
Mts. of Central Asia
Mts. of Southern Asia
Mts. of Northern Asia
Mts. of Europe
Mts. of Eastern Asia
Mts. of Further India
Mts. of Western Asia
Mts. of Central Asia
Mts. of Southern Asia
Mts. of Northern Asia
Mts. of Europe
Longitude from Greenwich
40° 50° 60° 70° 80° 90° 100° 110° 120° 130° 140°
POATES ENGR'G CO., N.Y.

ranges known as the Lebanon and Anti-Lebanon to heights respectively of over 10,000 and 9000 feet, and slope steeply in terraces down to the narrow coast lands of Phœnicia and Palestine. The peninsula of Arabia is a tableland of moderate height, continuous with the Syrian Desert and bordered by low mountain ranges. In the extreme south the mountains attain an elevation of nearly 8000 feet. Arabia is separated from the Armenian Plateau on the north by the valleys of the Tigris and Euphrates. Most of its area is desert, but in the interior the plateau reaches an elevation sufficient to induce enough rainfall for the cultivation of crops; this is, therefore, the populated region.

South of the Himalayas, at the head of the peninsula of India, is a depression drained on the east by the Ganges and on the west by the Indus. The Ganges valley is the densely populated region of India. East of the lower Indus is the desert of Sindh. Farther south on the peninsula is the plateau of the Deccan, which rises to an average height of from 1500 to 2000 feet. It is separated on the west from the narrow coast level of Malabar by the Western Ghats: on the east, from the broad level coast of Coromandel, by the Eastern Ghats: on the north it is separated from the low plains of Hindustan by the Vindhya Range and Malwa Plateau; and on the south the Ghats unite at the sources of the Kaveri forming the Nilgiri, or Blue Mountains, 8760 feet high, the loftiest chain in the peninsular portion of India. Burma and Assam are crossed by numerous mountain groups, which extend in broken lines from the interior of Tibet to the extremity of the Malay Peninsula. China Proper and French Indo-China have mountainous interiors, while the whole eastern coast line of Asia from Korea northward is paralleled by lines of highlands. The Japanese Archipelago may be regarded as a submerged mountain chain rising from the immense depths of the Pacific and reaching with the Kurile Islands northward to Kamtchatka. The chain is crowned by numerous volcanic cones, and throughout its extent earthquakes and seismic disturbances are frequent phenomena.

**Hydrography.** The hydrography of Asia displays as striking a variety as does the structure of its land surface. The Asiatic Alpine regions send down, in some directions, torrents of water, which form rivers almost rivaling in magnificence those of America, and flowing for hundreds of miles through plains of unsurpassed fertility. On the other hand, there are wide-stretching tracts similar to the deserts of northern Africa and of equal sterility.

The seven great river systems of Asia are: the Mesopotamian, that of northwest India, that of northeast India and Tibet, the Indo-Chinese, the Chinese, the Siberian, and that of the Kirghiz steppe and Russian Turkestan. The first comprises the two famous streams, the Tigris and Euphrates, flowing into the Persian Gulf; the second comprises the Indus with its tributaries; the third system comprises the Brahmaputra and Ganges; the fourth comprises the rivers of the Indo-Chinese Peninsula, the chief of which are the Irawadi, the Salwen, the Menam, and the Mekong; the fifth system is the Chinese, comprising four great streams, all of which flow in a general easterly direction into the Pacific—the Si-kiang, the Yang-tzi-kiang, the Hoang-ho, and the Amur; the sixth system comprises the large rivers of Siberia, the principal of which are the Obi, the Yenisei, and the Lena—all have their source in the ranges bordering Siberia on the south and flow northward, traversing the great plain for 800 or 900 miles before their sluggish waters reach the Frozen Sea; the seventh system comprises the Ural, which flows into the Caspian Sea, and several other inland rivers, including the Amu-Darya and the Syr-Darya, flowing into the Aral Sea, the Ili, which flows into Lake Balkash, and the Tchui.

Asia is deficient in lakes. At the base of the ranges limiting Siberia on the south, are, however, several of magnitude, among them Baikal, believed to be the deepest fresh-water lake in the world, Balkash, and Issyk-kul. Farther west, in the depression east of the Caucasus, are the Aral and Caspian seas, which have no outlet; the Caspian Sea is 85 feet below the level of the sea. In Syria is the Dead Sea, occupying with its valley a deep depression, the surface of the lake being about 1300 feet below sea level. In the Armenian Mountains are lakes Van and Uramia, lying at great elevations and having no outlets. In Tibet and the desert of Gobi lakes without outlets are numerous, since, owing to arid conditions, drainage systems are not yet developed. A large part of Asia, comprising Tibet, Mongolia, Turkestan, and most of Baluchistan, Persia, and Arabia, i.e., nearly all the central and southwestern parts of the continent, the region in which the rainfall is deficient, has no drainage to the sea.

**Geology.** Little is known of the geology of the greater part of Asia. Certain limited regions, such as India, have been studied in detail, but our knowledge of the greater part of the continent has been derived from piecing together the reports of explorers. The great mountain systems consist principally of granites, gneisses, schists, and allied rocks, with, in many cases, the older stratified rocks lying on their flanks. This is the case with the Himalayas, whose uplift is believed to have occurred as late as Tertiary times and with the Tian-shan, Altai, Stanovoi, and the Kuenlun ranges. It has been found in two areas of the Kara-koram Mountains that elevations of igneous origin are fronted on the other side of glaciers by elevations of sedimentary formation. The Ural Mountains, also, have a metamorphic nucleus. In the Caucasus, in Armenia, the Vindhya Range of India, and in Persia, are extinct volcanoes, which have contributed lava and ashes to the building of the mountains, while in the peninsula of Kamtchatka, the Japanese Islands, and the East Indies are many active cones. Indeed, this region on the east and southeast of Asia is one of the largest and most active volcanic regions on the earth.

The vast plain of Siberia is floored in succession from east to west with stratified beds, ranging from the oldest to the youngest, with large areas of eruptive and metamorphic rocks. The desert of Gobi and the plateau of Tibet are, except for the mountain ranges, floored with Tertiary and Quaternary beds. In North China are enormously deep beds of loess, which, especially in the region of the Hoang-Ho, has occasioned both remarkable topography and great fertility. Farther south in China the rocks are much older, consisting of Carboniferous and Jurassic beds, and also of Paleozoic rocks and Mesozoic deposits. The western plateaus in Afghanistan, Baluchistan, Persia, and Asia

Minor are in the main covered with Tertiary and Quaternary rocks, but in Arabia a large part of the plateau is floored with Jurassic beds. The great depression of northern India, south of the Himalayas, is a Tertiary deposit and a part of a large land area that once extended across the Indian Ocean to South Africa. The peninsula itself is composed of metamorphic and igneous rocks, with here and there areas of Paleozoic beds. Glaciers are found chiefly in the high mountain regions of the Tian-shan, Kuenlun, and Himalaya ranges, in the Tibetan highland, and in the Caucasus. No glaciers are found near the Arctic coast, owing to the deficient precipitation. See *Geology*, under INDIA; CHINESE EMPIRE.

**Climate.** Asia has a great variety of climate, owing to its range of latitude, altitude, and its relations to the bordering seas. It is in the main a continental climate, with light rainfall, a dry atmosphere, and great extremes of temperature. Near the coasts the climate is modified by the proximity of the sea, but this influence extends but a short distance inland, as the prevailing winds are off the land, except in the south, and even there the contrary is the case only during the prevalence of the monsoons. The whole of northern Asia lies within the range of the prevailing westerly winds of the Northern Hemisphere, in which are found the extensive cyclones and anti-cyclones which give variability to the weather in temperate latitudes. On the eastern and southeastern coasts cyclones of the hurricane type originate in the region of the tropical islands, and, pursuing a course at first westerly, under the influence of the trades, gradually turn toward the north and east, often ravaging the coast to some distance inland. In the extreme southern part of Asia occur general storms of hurricane character and local storms of the tornado form.

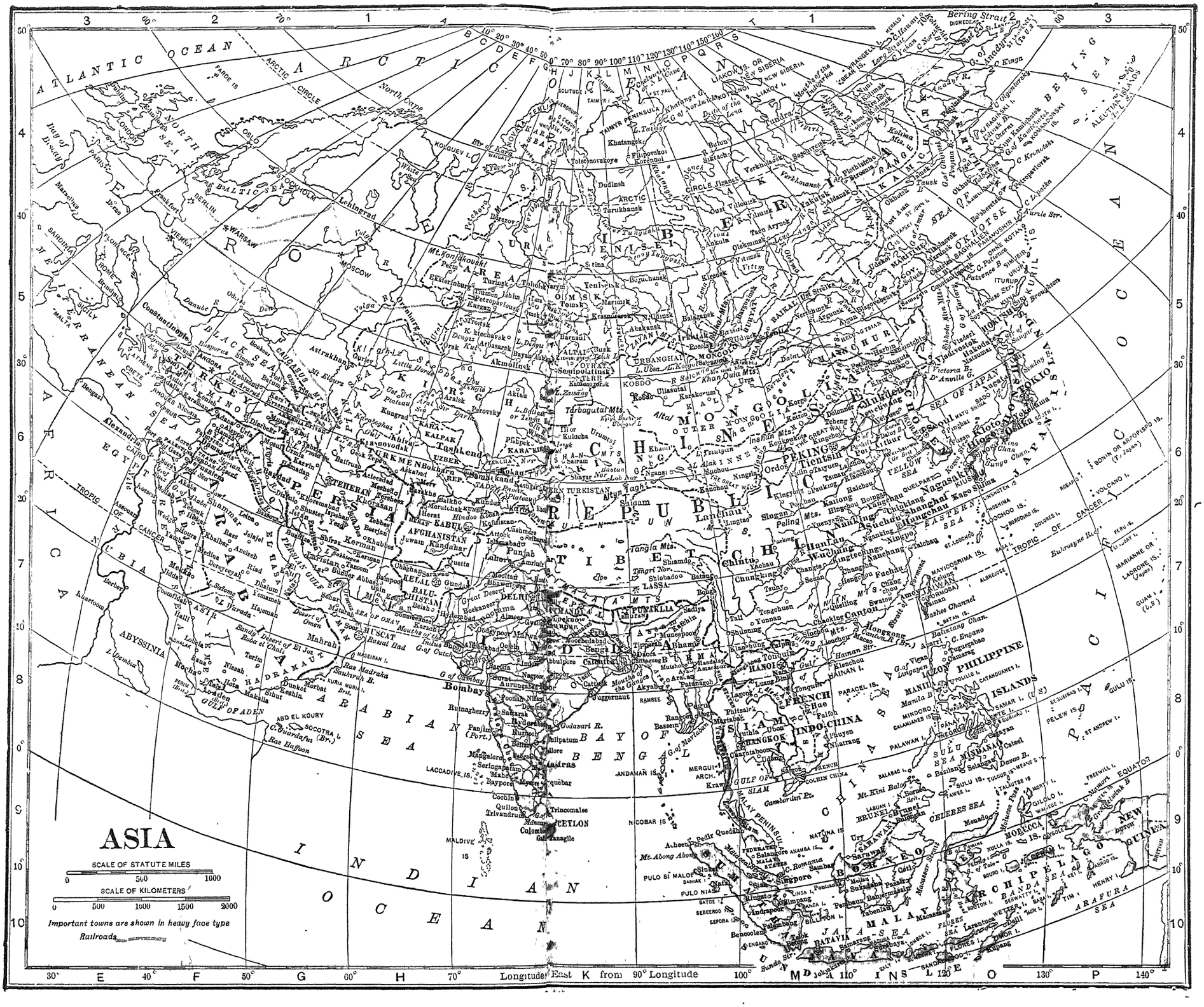
**Temperature.** The mean annual temperature in Asia, reduced to sea level, decreases uninterruptedly from about 90° F. at the south to 0° at the north. On the eastern coast the decrease in temperature, with increase in latitude, is somewhat slower than in the interior, but on the whole the isotherms follow the parallels quite closely, especially in the southern half of Asia. The isotherm of 32° crosses eastward from Archangel with a slightly southerly bend, to the mouth of the Amur. On the western side of Asia the temperatures decrease from 72° at Suez to 14° at the northern end of the Ural Mountains. On the eastern coast there is a decrease from 78° in Siam to 10° at Bering Strait. The region of greatest cold is near Verkhoyansk, in Siberia, on the Yana River, but a short distance north of the Arctic Circle, between the meridians of 130° and 140° E.

The average temperatures for January decrease from about 80° at the south of the continent to —60° in the neighborhood of Verkhoyansk, whence there is an increase to —40° on the coast. From Verkhoyansk, the centre of cold, the temperature rises in all directions; westward along the Arctic coast to —4° at the northern end of the Urals, and eastward to —13° at Bering Strait. On the western side of the continent the temperature decreases from 57° at Suez to —4° in the northern Urals. On the eastern coast the temperature decreases from about 80° at the south to —13° at Bering Strait. The isotherms in the northern part of the continent swing far to the south in the interior, showing much lower temperatures there than on the coasts in winter. The isotherm of 32 runs nearly due east from the middle of the Caspian Sea to the middle of the Yellow Sea, showing in this latitude little difference in winter temperatures between the coast and the interior. Throughout the greater part of northern Asia the January temperatures are more than 18° below the normal for those latitudes, and at Verkhoyansk it is 47° below normal, owing to the distance from the sea and its influences.

In July the highest temperature is on the Arabian and Persian plateaus, where the average is 93°; from this section there is a fall to 82° in southern India, southern Siam, and southern China, and toward the north and east, to 39° throughout most of the Arctic coast. The maximum temperature of the whole continent ranges from 120° in Persia and Arabia to 75° on the northern coast, and in the northern interior it reaches 100°. The minimum ranges from about 65° in the extreme south to —58° on the northern coast, but in the neighborhood of Verkhoyansk, in the interior of northeastern Asia, a temperature of 92° below zero has been observed.

**Rainfall.** In most regions of Asia, except near the Pacific coast and south of the Himalayas, the rainfall is scanty. On the immediate coast of the Arctic Ocean in Siberia the annual precipitation is under 10 inches. Elsewhere in Siberia it is between 10 and 20 inches. In the great desert regions of Gobi, the Caspian and Aral Sea regions, and in Persia, it is below 10 inches. The explorations of Stein, Huntington and others, in the southern part of east Turkestan and especially in the dreaded Takla Makan Desert, have revealed the ruins of many large centres of population, showing that this region must once have had abundant rain. In most of Arabia the rainfall is below 10 inches, except in the higher plateau of the interior, where it reaches 20 inches. In Manchuria the rainfall increases to 30 inches, and in China it increases southward from 30 inches in the north to 40 inches at the mouth of the Hoang, to 70 inches in the southern part, and is 80 inches in Japan. The Malay Peninsula has an excessive rainfall. In the Himalaya region the rainfall on the southern slopes sometimes amounts to over 160 inches, in one limited region to 475 inches, and for much of the southeastern coast region of India it reaches from 120 to 160 inches; but it decreases very rapidly west of Calcutta, and on most of the Deccan Plateau it is only 20 inches, increasing again on the western coast to from 40 to 160 inches. The heaviest annual rainfall in the world occurs in Assam, to the south of the eastern Himalayas, where a precipitation of 800 inches is on record. While the normal rainfall for southern Asia may be estimated at from 40 to 60 inches, yet wherever a mountain range intercepts the moist winds blowing from the Indian Ocean, a rainfall of from 140 to 160 inches occurs on the windward side of the mountains, and usually of from 20 to 40 inches on the leeward side. Northern Asia has rain at all seasons, except in the deserts, where rain seldom falls. Southern Asia, including India and the Malay Peninsula, is subjected to periodic rains, the maximum occurring in summer, the period of the southwest monsoons.

**Winds.** While southern Asia is in the region of normal winds, the trades, yet these winds are very much, sometimes totally, changed by the monsoons. During the summer season the in-


ASIA
SCALE OF STATUTE MILES
0 500 1000
SCALE OF KILOMETERS
0 500 1000 1500 2000
Important towns are shown in heavy face type
Railroads
Longitude East from 90° Longitude
ATLANTIC OCEAN
ARCTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
EUROPE
ASIA
AFRICA
ARABIAN SEA
BAY OF BENGAL
CHINA SEA
JAVA SEA
CELEBES SEA
ARAFURA SEA
BERING SEA
BALTIC SEA
BLACK SEA
MEDITERRANEAN SEA
RED SEA
PERSIAN GULF
GULF OF ADEN
GULF OF SIAM
YELLOW SEA
SEA OF JAPAN
SEA OF OKHOTSK
TURKEY IN ASIA
ARABIA
PERSIA
AFGHANISTAN
BALUCHISTAN
TURKESTAN
SIBERIA
MONGOLIA
MANCHURIA
CHINA
TIBET
INDIA
FRENCH INDO-CHINA
SIAM
MALAY PENINSULA
BORNEO
PHILIPPINE ISLANDS
LUZON
MINDANAO
SUMATRA
JAVA
CEYLON
NEW GUINEA
MOLUCCA ISLANDS
ARCHIPELAGO
KAMCHATKA
KURILE ISLANDS
ALEUTIAN ISLANDS
NEW SIBERIA
FORMOSA
HAINAN I.
LIAKOV I.
BERING STRAIT
ARCTIC CIRCLE
TROPIC OF CANCER
EQUATOR
Longitude East from 90° Longitude

portance. The great empires of antiquity arose among the Semites of Mesopotamia and the Aryans of Iran and Hindustan. The art of writing, literature, the sciences, political institutions, were developed here to a higher degree of perfection than even in ancient Egypt. Above all, the white race in Asia has been the promulgator of the world's great religions. From the Asiatic Semites came Judaism, Christianity, and Mohammedanism—three faiths which embrace the whole western world. From the Asiatic Aryans came Zoroastrianism with its great principle of the conflict between good and evil, destined subsequently to influence the Jew and the Christian; Brahmanism, which is the ritualistic and sacerdotal expression of the Aryan nature; and Buddhism, which may be considered as the Aryan anticipation of Christianity. From the last developed Jainism and Lamaism. The spread of Aryan Buddhism in eastern Asia, with its influence on the social life of the people, corresponds to the expansion of Semitic religions in the West.

**The Yellow Race.** The yellow race is the most typically Asiatic of all. It numbers seven-tenths of the population of the continent and covers practically all its extent outside of the domains of the Aryo-Semites—into which, indeed, it has not failed to intrude, first in prehistoric ages and again in modern times, with the result that there is a large Mongolian element in the Caucasians of Asia Minor, Afghanistan, Baluchistan, and India. The race may be divided into two great geographical groups—one in the north, embracing all the tribes of Siberia and Turkestan, with their centre somewhere near the Altai Mountains; the other in the south, comprehending the peoples of China and Farther India, with their primitive home in the mountains of Tibet. 1. The Siberian branch of the yellow race includes a large variety of stocks. In the extreme north, on the borders of the Arctic Ocean, exist a handful of aboriginal groups, the survivors of numerous tribes which lived there in ancient times, destined themselves to speedy extinction. Such are the Yukaghirs, the Tchuktchis, the Koriaks, and the Kamtchatkans, numbering in all about 10,000. The results of the Jesup North Pacific Expedition (1900–13) suggest that the so-called "Palæo-Asiatic" group of Siberian peoples (i.e., the Tchuktchis or Chukchees, Koriaks, Kamtchatkans, Yukaghirs, etc.) belong properly with the American Indians, representing an overflow from the New World into the Old. Farther west is the great Ural-Altaic stock, consisting of a large number of families which are themselves subdivided into powerful tribes. These include the Samoyed group, which comprises the Yenisei and the Ostiaks, living near the shores of the Arctic; the Finno-Lapponic group, including the Votiaks, Mordwins, and Voguls, dwelling in the neighborhood of Tobolsk, Tomsk, and the Ural Mountains, as well as the Magyars of Hungary and some of the population of the Balkan region and European Russia, now Aryanized as to speech; the Turko-Tatar group, Yakuts, Uigurs, Turkomans, and Khirgiz, occupying a vast territory in southwestern Siberia and Central Asia; the Mongol group, subdivided geographically into North Mongols, East Mongols, and West Mongols (Kalmuks), with their centre of population around Lake Baikal, but found also in the region bounded by the Volga, the Don, the Caucasus, and the Caspian Sea, and in China; finally, the Tungus group, consisting of the Tunguses proper, the Manchus, and the Orotong peoples which dwell in the forests of eastern Siberia and extend into northern China. To the Siberian branch also belong the Japanese, the Koreans in part, the natives of the Liu-Kiu Islands, etc. In Turkestan and the region of the Caucasus are minor people of mixed origin, who may belong by language or by blood to the Siberian branch of the yellow race.

2. The southern branch of the yellow race, the Sinitic or Tibeto-Chinese, embraces the Chinese proper, with many variations in language and much mixture of blood; the Tibetans, to whom should be added as related by blood more than by language, minor peoples of the southern slope of the Himalayas; the races of Farther India, comprising the Annamese, the Burmese, the Siamese, the Cambodians, the Karens, the Khamtis, and a number of others. In addition, some ethnologists make the Malays and Polynesians, and even the Amerinds, mere subdivisions of the yellow race. The two great branches of the yellow race diverge in the mode of inflecting their language, just as the two great branches of the white race in Asia, the Semites and the Aryans do, the Siberian peoples possessing polysyllabic agglutinative vernaculars, while those of the Chinese peoples are monosyllabic, isolating. The Japanese language is polysyllabic though its alphabet has been adopted from the Chinese. The theory which made the yellow race the first inhabitants of most of Europe and all of western Asia (Turanians, Accado-Sumerians, etc.), seems no longer tenable; neither can it be asserted that the oldest culture of the yellow race in China, Korea, and Japan is either a copy of the old Babylonian civilization or the result of comparatively recent Aryan influence. Chinese civilization must be regarded as having originated with the removal of the prehistoric races from the plateau of Tibet to the rich river lands of eastern China, just as Aramaic civilization originated with the immigration of the Semites of Arabia into the plains of Mesopotamia. Chinese civilization, therefore, may be considered as the first great accomplishment of the yellow race. The characteristics of that civilization — inveterate conservatism, general apathy, and unlimited submissiveness—should not, however, be considered as inherent in the race, one great branch of which, the Japanese, have only recently demonstrated the possession of quite the opposite qualities. The Siberian members of the race are more notable for what they have done in Europe than for the part they have played in Asia; the mighty empires of Genghis Khan, Timur, and Baber were not enduring; on the other hand, the inroads of the Bulgarians, Finns, and Magyars into Europe have produced lasting results.

**The Brown Race.** The Malayan or Malayo-Polynesian peoples are denied by many ethnologists the position of a race, and are regarded as merely the insular and oceanic divisions of the yellow race. Their primitive home was somewhere in the neighborhood of the peninsula of Malacca, the situation of which favored the distribution of the stock over the islands of the Indian and Pacific oceans. Physically the Malays of the continent stand nearer to the Tibeto-Chinese branch of the yellow race, while the Polynesians come closer to the Siberians. The brown race includes the Malays proper of Malacca, the Sundanese and Javanese of Java, the tribes of Sumatra, Borneo, Celebes, and For-

mosa, and the inhabitants of the Philippines, where the most important family is that of the Tagals. Lastly, there are the Polynesians and the Micronesians, all over the Pacific, and the Hovas of Madagascar. The presence of branches of the Malays in such widely scattered regions as the Philippines, Hawaii, Madagascar, and New Zealand evidences the wonderful power of expansion possessed by the race. Its capacities for culture have been demonstrated in New Zealand, where it has attained its highest development. There the Maoris are on terms of equality in every way with their white fellow-citizens, enjoying representation in Parliament and a share in the government. Malay elements are discernible in New Guinea, northern Australia, the interior of Farther India, southern Hindustan, and its adjacent islands, parts of China, and even Japan. Indeed, there is some reason to believe that the addition of the Malayan element may have made in great part the difference between the Japanese and the Chinese.

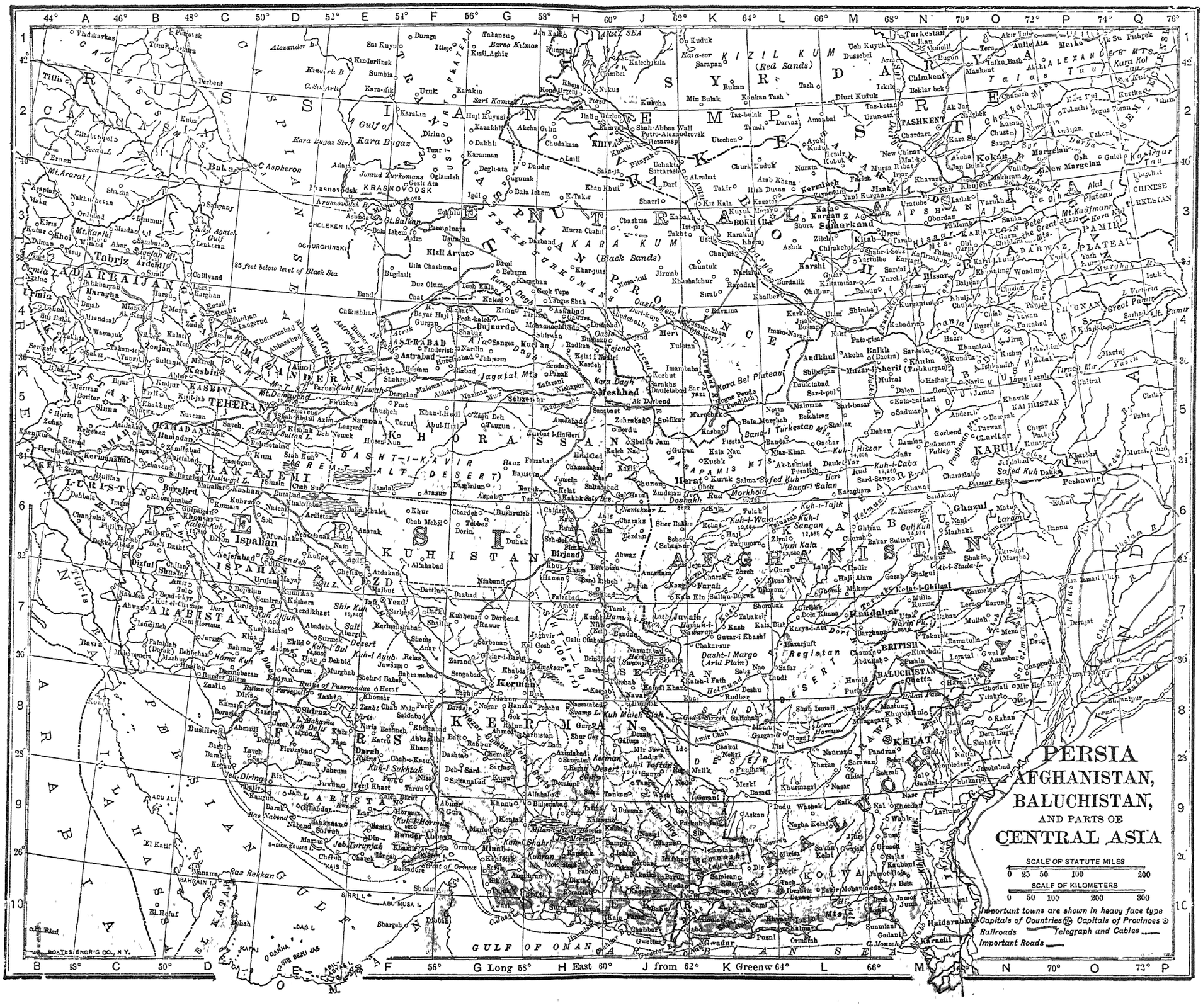
**Other Races.** *The Black Race.*—Examples are the Negritos of the Philippines, the Papuans and their Melanesian kindred, the Andaman islanders, and a few small tribes in the Malay Peninsula, such as the Sakai and the Semangs. Some ethnologists maintain that the white, yellow, and brown races were preceded all over southeastern Asia and a great part of the Malayo-Polynesian area by tribes of the black race, which they regard as nearer to the original human stock. It would seem, however, that the yellow race, from its nearness to the type of the child and for certain psychic reasons, has an equal claim to this distinction. *The Red Race.*—In the extreme northeast of the continent, about East Cape, dwell the Yuit, a people of Eskimo stock, whose numbers were much larger formerly. As immigrants from Arctic America, these Yuit represent the Amerinds or red race of America. Some of the Aleuts also, who belong to the Eskimo stock, have wandered from island to island until they have reached the Asiatic coast, while a few have been transferred thither by the Russians. *Peoples of Doubtful Affinities.*—Such are the Aino of Japan, the Miao-tse and perhaps some other primitive peoples of China, the Cambodian Khmers, the Veddas of Ceylon, and the Dravidian and Kolarian peoples of southern India. Of these, the Aino represent probably a very ancient mixture of primitive white and yellow races, and the same may be true of the Miao-tse and the Khmers. The Dravidians, more by language than by physical type, stand distinct from the mass of Indian natives, and though ethnologists are inclined to group them with the Australians, they represent, more probably, a mixture of early negroid, yellow, and white types. They are now considerably Aryanized in culture and assimilated more to the type of the white race in India. The Veddas, one of the most primitive peoples in existence, are an older, mixed people of similar ancestry. Some of the Dravidian peoples (Tamil, Telugu, etc.) have shown themselves capable of a high degree of culture, while others still linger in barbarism.

**The Origin of Man.** The oldest evidences of a high order of civilization in Asia (belonging, in all probability, to the white race) exist in Asia Minor; the most ancient remains of individual man may be looked for in the southeastern region of the continent. Man's precursor, the *Pithecanthropus*, was discovered in the Pliocene deposits of Trinil, in Java, in 1891, by Dr. Dubois. Somewhere in southeastern Asia, then, possibly, individual man was born, just as somewhere in southwestern Asia men in society laid the foundations of the first great civilizations.

### GENERAL HISTORY

It was characteristic of the social groups of Asia that they early attained the limit of their development and settled into grooves in which their life ran for ages. (See under ASSYRIA; BABYLONIA; CHINESE EMPIRE.) After the rise of the great Medo-Persian Empire under Cyrus, southwestern Asia was brought into contact with the earliest European civilization, that of the Hellenic people, and a contest for supremacy took place. (See GREECE; PERSIA.) This was terminated by the triumphant march of Alexander the Great eastward to the Indus and the establishment of the Hellenistic kingdoms. Later the Roman Empire conquered most of these kingdoms, but was constantly menaced by Persia. The struggle of the two powers weakened both at the beginning of the seventh century. Then the rise of Mohammedanism created a new religio-secular power in the southwest which, when the warlike Turkish tribes from the interior became dominant in the Mohammedan world, wrested all of its Asiatic provinces from the weakened Eastern Empire. The Crusades (eleventh to thirteenth centuries) were the last mediæval struggle for possession between the West and the East. The rise of the Ottoman power made Asia once more a menace to Europe. (See MOHAMMED; CALIPH; ABBASSIDES; OMMIADS; SELJUKS; CRUSADES; TURKEY.) The march of events in the southwest cut off the rest of Asia completely from the western world, depriving the latter of even such incomplete knowledge of the vast Oriental continent as was possessed in antiquity, when there were trading routes to the farther East through Bactria. The stationary character of Asiatic civilization, and the lack of initiative among the mass of the people, prevented the great social and political changes that make the general continental history of Europe so full of meaning. Until the advent of the European powers there was little of this general history for Asia, except in connection with the great waves of conquest which rolled over the continent and frequently extended into Europe. These are treated in the articles GENGHIS KHAN; KUBLAI KHAN; MONGOL DYNASTIES; TIMUR; MOGUL, GREAT.

A new era opened with the rediscovery of the East by Europe in the fifteenth and sixteenth centuries. Portuguese navigators and traders followed in the path of Vasco da Gama (1497–98) and established factories at Goa and Macao and in other places. Spain took possession of the Philippines in 1565, as a result of Magellan's epochal voyage across the Pacific. The Dutch were also among the early comers. The pushing western nations, in pursuit of commercial advantage, thereafter steadily increased their influence and gradually acquired control of depots or considerable territory in India, the East Indies, and China. In the middle of the eighteenth century an apparently insignificant phase of the Seven Years' War was fought out in India between the English, led by Clive, and the French, under Dupleix. The fate of that country of ancient and warring nations was determined by the English triumph. The advance of European influence may be followed in this


PERSIA
AFGHANISTAN,
BALUCHISTAN,
AND PARTS OF
CENTRAL ASIA
SCALE OF STATUTE MILES
0 25 50 100 200
SCALE OF KILOMETERS
0 50 100 200 300
Important towns are shown in heavy face type
Capitals of Countries ⊙ Capitals of Provinces ⊙
Railroads
Telegraph and Cables
Important Roads
ROAD SURVEYING CO., N.Y.
CASPIAN SEA
PERSIAN GULF
GULF OF OMAN
ARABIAN SEA
ARAL SEA
KARA KUM (Black Sands)
KIZIL KUM (Red Sands)
GREAT SALT DESERT
DASHT-I-KAVIR
DESERT OF LUT
Dasht-i Margo (Arid Plain)
Registan DESERT
SANDY DESERT
KARAKORUM MTS.
HINDU KUSH
ALEXANDER MTS.
Kara Tau
Talas Tau
Mt. Ararat
Mt. Demavend
Mt. Karkh
Mt. Kaufmann 22,950
Peter the Great Mts.
Alai
Pamir
Great Pamir
Little Pamir
Victoria
Kara Kul
Yashil Kul
Sarikol Mts.
Kara Bel Plateau
Kara Tagh Plateau
Kara Koram Pass
Khyber Pass
Bolan Pass
Harnai Pass
Gomal Pass
Peiwar Pass
Kurram Pass
Shutargardan Pass
Khojak Pass
Dora Pass
Kotal-i-Ghilzai
Kotal-i-Khoja Amran
Kotal-i-Sabzak
Kotal-i-Shibar
Kotal-i-Tizak
Kotal-i-Wazi
Kotal-i-Zard
Kotal-i-Zohak
Kuh-i-Baba
Kuh-i-Bul
Kuh-i-Hazar
Kuh-i-Hindu Kush
Kuh-i-Hormuz
Kuh-i-Lakan
Kuh-i-Malik Siah
Kuh-i-Sahro
Kuh-i-Sangan 12,668
Kuh-i-Sukhtak
Kuh-i-Taftan 12,640
Kuh-i-Tajik
Kuh-i-Wala 12,456
Kuh-i-Zard
Safed Kuh 14,500
Safed Kuh Dakka
Band-i-Balan
Band-i-Turkestan Mts.
Band-i-Zardalu
Hazarjuft
Koh-i-Malik Siah
Koh-i-Sultan
Koh-i-Taftan
Koh-i-Zor
Koh-i-Zulfikar
Kuh-i-Bul
Kuh-i-Ayub
Kuh-i-Jupar
Kuh-i-Khoja Ghar
Kuh-i-Khoja Rawash
Kuh-i-Khwaja Amran

work through the history of the different countries affected thereby. In the meantime the expedition of the Cossack partisan leader Yermak across the Urals (1580–82) into what is now Siberia began the steady movement of Russia into Central Asia and across the continent to the Pacific. (See RUSSIA; SIBERIA.) These latter movements brought the impulse of western life into the development of Asia, and with it the complications of European politics, the sharp rivalries for political influence in the interest of commercial expansion, and the active modern competition with railway and steamship. The rapid growth of world politics has given a new significance and unity to the history of Asia. The details of this later period of transformation may be followed in the histories of the several countries, especially CHINA, JAPAN, INDIA, and RUSSIA. See also the article FAR EASTERN QUESTION, and the references therewith.

**Political Problems.** In the political affairs of Asia, as in those of the African continent, the predominance of European influence has become marked during the last 200 years, though the power of the European nations has not been as completely established over the native races of Asia as over those of the Dark Continent. Still, reference to the table appended to this article will show that nearly two-thirds of the area of Asia and nearly one-half of its population are under the control of the European powers, and even in the unappropriated area and over the nominally independent peoples, the ascendency of western culture, spreading mainly through the channels of commerce, is rapidly being established. While Siam and Persia are as yet autonomous, the play of European politics is rapidly becoming the guiding force of their national life. Ultimately Siam seems destined to be annexed to the Indo-Chinese Empire, which France has built up in Farther India; Persia at present is a stake in the political game going on between Great Britain and Russia; and China, by reason of its huge size and the immense opportunities it promises for exploitation, has awakened the ambitions of all the nations of Europe. Japan and China alone have safely grounded their national existence, because their people have shown an aptitude for adopting the civilization of the Europeans without falling under the power of their civilizers. The striking fact, then, about conditions in Asia at the present time is that the continent which first gave civilization to the world has in turn become subject to the higher state of civilization to which Europe, favored by many circumstances, has attained. The struggle for supremacy is much more acute in Asia than in Africa, because in the former country European culture has no free field to work in, and finds itself confronted by political and religious systems of great antiquity and of sufficient strength to render powerful resistance. In the southern part of Asia there is not any room for the influx of European colonization, as there is in the sparsely settled continent of Africa. With an area exceeding that of Africa by one-half, the Asiatic continent has about five times its population, and therefore the establishment of European domination must mean not so much the actual occupation of the soil by the western nations as the control of the native races by the European powers, acting through the long-established machinery of local government and ancient forms of life. The rôle played by Russia in Siberia, however, must be distinguished from the part played by the other nations in southern Asia; for Siberia, the Russian provinces in Central Asia, and the Caucasus region are in reality not foreign possessions, but constitute an integral unit with the Russian Empire in Europe, from which the first two are separated by no considerable physical barriers. The plains of Siberia are a continuation of the South Russian steppes, and the nomad inhabitants of Siberia are closely akin to the Tatar peoples that dwell on the lower Volga and the Caspian. Finally, the vast stretches of Russian Asia, with their mere sprinkling of inhabitants, afford such an opportunity for European colonization as the southern part of the continent can never present.

Among the powers of Europe jealousy and dissension have appeared over the question of predominance in Asia, and, as in Africa, certain spheres of influence have been marked out in which individual powers are allowed a free hand in their dealings with the natives. The danger of conflict arises when the boundaries approach too near to each other. The supremacy of England is, of course, recognized in India and Burma. Russia is predominant over all of northern Asia. Persia and Afghanistan are at present neutral ground, or rather the battle-places of Russian and British influence. French influence is supreme in Indo-China, and the power of the Dutch is predominant in the East Indies. Germany is an important factor in the Turkish provinces of Asia Minor, and by the seizure of Kiao-chau in 1897 gained a foothold in China. Much of that republic, also, although still intact, has been partitioned into certain spheres, and the most interesting question of the future is whether these spheres of influence in China are destined to become foreign dependencies in fact, or whether one power or a combination of powers will prove strong enough to preserve its integrity until such a time as China, inspired by the example of Japan, shall succeed in developing its resources to a point where it may openly challenge any attack on its existence. For the spread of Christianity, the establishment of the republic, and the civil war in Mongolia and China proper, see CHINA.

**Political Divisions of Asia.** Over one-third of Asia is included in the former Russian Empire; the area of Siberia, Transcaucasia, and Russian Central Asia is stated at 6,294,121 square miles, and the population 25,645,000. About one-fourth of Asia is included in the Chinese dominions (China proper, Manchuria, Mongolia, Sinkiang, and Tibet), which have an area of about 4,278,000 square miles, with a population calculated at about 329,600,000. About one-ninth (India, Ceylon, Straits Settlements, Cyprus, Aden, etc.) is under the sway of England, whose subjects, including the inhabitants of the native states of India, number over 320,000,000. Independent Arabia embraces about 5 per cent of the area of Asia. An area of about 684,000 square miles is included in former Asiatic Turkey, comprising Asia Minor, Armenia, Kurdistan, Mesopotamia, Syria, and the Arabian territories of Hejaz and Yemen, with an estimated population of 17,000,000. Persia has an area of about 635,000 square miles, and its population is supposed to be upward of 9,000,000. French Indo-China (Annam, Tongking, Cambodia, Cochin China, etc.) embraces about 310,000 square miles, the population being in the neigh-

borhood of 17,000,000. The area of Siam is about 230,000 square miles, and its population 8,820,000. Afghanistan has an area of about 250,000 square miles, with a population estimated at about 6,380,500. The dominions of Japan (excluding Korea) embrace 174,700 square miles, with a population of about 55,990,000; Korea has an area of 84,106 square miles and about 17,300,000 inhabitants. Oman, in Arabia, has an area of about 82,000 square miles and a population of about 500,000. In the Himalayan region are the independent states of Nepal and Bhutan. The estimated area of the former is 54,000 square miles; its population is probably about 3,000,000, though some estimates are higher. The area of Bhutan is about 20,000 square miles, and its population about 250,000. In the Malay Peninsula there are several states under British protection; the Federated Malay States comprise 27,500 square miles, with 1,037,000 inhabitants. Portugal and France have small possessions in India, and Portugal, Great Britain, France, and Japan have establishments on the coast of China. The great archipelago which lies to the southeast of the Asiatic continent belongs mainly to the Netherlands; the Dutch East Indies (exclusive of Dutch New Guinea) embrace some 587,000 square miles, with upward of 47,700,000 inhabitants.

See articles on the separate geographic regions of Asia and on its rivers and mountains. See also DISTRIBUTION OF ANIMALS; GEOGRAPHY; MOUNTAIN. For political aspects, see SUPPLEMENT.

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**ASIA,** IN THE BIBLE. The name "Asia" is not met with in the Old Testament, but occurs several times in the Apocrypha, where it is used as a general term to indicate the territory ruled over by the Seleucidæ, i.e., the Tigris-Euphrates valley, eastern Asia Minor, Syria, Phœnicia, and Palestine. This was in harmony with Greek usage, according to which the term meant much the same as it does to-day. The Romans, however, used the word in a more restricted sense, to indicate the province of Asia, which was constituted in 133–130 B.C., after the death of Attalus III of Pergamum, having been ceded to the Romans in his will. It was comprised of Mysia, Lydia, Caria, and the islands of the coast. The western part of Phrygia (Phrygia Asiana) was annexed to Asia temporarily in 116 B.C., and, after being detached and assigned to Cilicia, was finally incorporated with it in 49 B.C. It was governed by the Senate, through a proconsul, with three legates and a quæstor under him. Its principal cities were Ephesus, Pergamum, and Smyrna. It was the wealthiest, and, with the exception of Africa, the most important of the imperial provinces. As such, it was conscious of the vital significance of its connection with the Empire, and maintained with great devotion the cult of Augustus, in which the Emperor came to be associated in worship with the Ephesian Diana. In 297 A.D., under Diocletian, it was broken up into several small provinces, one of which, having Ephesus as its capital, retained the Asian name. In the New Testament the word is used in its Roman sense. At Ephesus, its chief city, Paul labored for upward of two years, with the result that the whole province became permeated with the truth of Christianity (Acts xix. 10, 26). To the churches of this province the circular Epistle to the Ephesians was addressed by Paul (see reference to them in the closing salutation of 1 Corinthians, which was written from Ephesus, xvi. 19), and they were made the formal recipients of the message of John in the Book of

Revelation (i. 9–iii. 22). See EPHESIANS, EPISTLE TO; CHURCHES OF ASIA, THE SEVEN.

**ASIA MI'NOR** (Lat.). The ancient name of what is now called Anatolia. It was divided into Pontus, Paphlagonia, Bithynia, Mysia, Lydia, Caria, Lycia, Pisidia, Pamphylia, Isauria, Cilicia, Cappadocia, Galatia, Phrygia, and Lycaonia. Along the western coast were Troas, Æolis, Ionia, and Doris (in Caria), the last three a series of Greek colonies. Greek colonies were also numerous along the north coast, on the shores of the Hellespont, Propontis, Bosporus, and Euxine. In the seventh century B.C. the Lydian Kingdom was the ruling power; but in the sixth century Asia passed under Persian rule. After the death of Alexander the Great Asia was portioned out among his generals, finally falling partly to the Seleucidæ and partly to the kingdom of Pergamum, which developed on the west coast. Under the Roman Emperors Asia Minor was generally prosperous, but suffered severely during the wars of the Byzantine Empire and has not recovered under Turkish rule. Consult Ramsay, *Historical Geography of Asia Minor* (London, 1890).

**ASIARCH,** ā'shĭ-ärk (Gk. *'Ασιάρχης, Asiarchēs,* from *'Ασία, Asia* + *ἄρχειν, archein,* to govern). The title of the delegates from the individual cities of Asia to the provincial assembly (*Commune Asiæ*), which met annually to regulate the worship of Rome and the Emperor, to institute games and gladiatorial contests, and to deliberate on political matters affecting the province. The position of Asiarch, paralleled in the other provinces, *Galatarch, Lykiarch, Pamphyliarch,* could be held in connection with any civil or religious office, even with the high-priesthood of an individual city, though the title of high priest of Asia was given alone to the officer who presided over the provincial assembly. The position was only for the year, though reëlection was possible, and the title might be retained. The honor was much sought for and was necessarily confined to persons of wealth. The institution lasted until the disintegration of the province under Diocletian in the third century. (See ASIA, IN THE BIBLE.) Among those who perhaps had had the position formerly but still retained the title were the friends of Paul, who cautioned him for his safety on the occasion of the uproar in the theatre at Ephesus (Acts xix. 31). Consult Mommsen, *Provinces of the Roman Empire* (Eng. trans., London, 1895), and Ramsay, *Cities and Bishoprics of Phrygia* (2 vols., London, 1895–97).

**ASIATIC** (ā'shĭ-ăt'ĭk) **BROTHERS.** A secret society, with aims similar to those of the Rosicrucians, which was formed in 1780 in Austria and thence extended over all Germany.

**ASIATIC SOCIETIES.** Associations for the study of the languages, antiquities, and history of the Eastern continent. The first was founded by the Dutch in 1780. In 1784 the Royal Asiatic Society of Bengal was formed. A French society was organized at Paris in 1822, and the Royal Asiatic Society of Great Britain and Ireland in 1823. An American society (see ORIENTAL SOCIETY, AMERICAN) was formed in 1842, a German society in 1845, and an Italian society in 1887.

**ASIMINA,** ă-sĭm'ĭ-nâ *or* ăs'ĭ-mī'nâ. See PAPAW.

**ASK,** ăsk (Ash Tree). The name in Norse mythology of the first man created by the gods. See also EMBLA.

**ASKABAD.** See ASKHABAD.

**AS'KALON.** See ASHKELON.

**ASKEW,** ăs'kū, or ASCOUGH, ANNE (1521–46). An English Protestant zealot and martyr. She was born at Stallingborough, Lincolnshire. She was of gentle birth, and against her will was made to supply the place of a deceased elder sister, as wife of Thomas Kyme, by whom she had two children. She was highly educated and devoted to biblical study. Because she had offended the priests, her husband, a stanch Roman Catholic, put her out of his house, which she willingly left. She went to London, it is supposed, to sue for a separation, but was arrested on a charge of heresy in March, 1545. Examined by the Bishop of London and others on the doctrine of transubstantiation, she denied its truth. She was imprisoned, but released on bail and acquitted on June 13. Again she antagonized her persecutors by the steadfast profession of her faith, and was rearrested in June, 1546, tortured by the rack, and finally burned at the stake in Smithfield, July 16, 1546. Consult J. Bale, *The Lattre Examinacyon of Anne Askew, etc.* (Marburg, 1547), and M. Webb, *An Account of Anne Askew* (London, 1865).

**ASKHABAD,** ăs'kȧ-bäd' (Ar. and Pers. *askh,* love + *abad,* dwelling, town). A town of Russian Turkestan, the political centre of the Trans-Caspian territory, situated on the Trans-Caspian Railway, 290 miles southeast of Mikhailovsk, the seaward terminus of the railway (Map: Asia Central, G 2). It is a thriving town, owing its prosperity to its transportation facilities and its position near the Persian frontier, which has made of it a commercial entrepôt for goods exchanged between Russia, Persia, Khiva, Bokhara, and Turkestan. It has a garrison of 4000 soldiers. Pop., 1904, 36,286; 1908, 41,729.

**ASKJA,** ăsk'yȧ. A volcano of Iceland, east of the centre of the island, in about lat. 65° N. and long. 16° 45′ W. It is 4600 feet high, has the largest crater in Iceland, over 700 feet deep, 34 square miles in area, and is still active. Its last eruption took place in 1875, and traces of it are found in the large pumice-covered tract on the northeastern slope of the mountain. The volcano stands in the midst of a widespread lava plain.

**ASMA'I,** ăs-mī' (ABU SAÏD ABD-AL-MALEK IBN KURAÏB AL-ASMA'I) (c.740–828 A.D.). The preceptor of Harun al-Rashid, and an important representative of Arabic literature. He was born in Bosra and after his career at Bagdad returned to his native city, where he died. Sir Henry Rawlinson calls Asma'i's history of the kings of Persia and Arabia previous to Islam, "perhaps the most valuable and authentic historic volume in the whole range of Arabian literature." His romance of *Antar* has been called "the Iliad of the desert." Several of his pupils became celebrated. One of them, Abu Hatim al Sejestani, collected his opinions on the greatest Arabic poets. Besides the great collection called al Asma'iyat, most of the diwans that have been preserved go back to him. Numerous manuscripts of his works are known to exist in private libraries, but have not yet been made accessible to scholars. Consult Ahlwardt, *Sammlungen alter arabischer Dichter, I, El Açma'ijjat* (Berlin, 1902); A. Haffner, *Texte zur arabischen Lexikographie* (Leipzig, 1905).

**ASMANNSHAUSEN,** ăs'mâns-hou'zen. See ASSMANNSHAUSEN.

**ASMARA.** Since 1900 the seat of govern-

ment in the Italian colony of Eritrea, northeast Africa, situated at an elevation of 7650 feet above sea level, about 50 miles southwest of the seaport of Massawa on the Red Sea (Map: Africa, H 3). The town is in the heart of a fertile region and is the centre of an active trade. It has had railway connection with Massawa since 1911, and extensions to the line have been proposed, those to Keren and Ghinda being the most important. There are gold mines in the vicinity. Asmara is strongly fortified and contains a garrison of Italian and native troops. The population, including Italians, Mohammedans, and natives (the latter chiefly), is about 10,000.

**AS'MODE'US.** Asmodeus figures largely in later Hebrew tradition, where he appears as the chief of the demons, just as Lilith was their queen (Talmud Babli, Erubin 100b). In Tobit (iii. 8, 17) he appears simply as an evil spirit possessed of great lust. Many scholars identify Asmodeus with *Aeshma daeva;* i.e., the demon of wrath who plays a prominent rôle in Mazdaism, the religion of Persia. In the Book of Tobit both have the same quality of lust and the same power of killing any one standing in their way. In the Book of Tobit Asmodeus is represented as having loved Sarah, the daughter of Raguel, and slain seven men in succession who were married to Sarah. When, however, Tobias came with the intention of marrying Sarah, he succeeded, with the help of his companion Raphael, in exorcising the demon by fumigating the heart and liver of a fish. Flying to Upper Egypt, the demon was pursued by Raphael, and bound, so that the couple henceforth had peace (Tobit vi. 14; vii. 2). In Talmudic legends Asmodeus is brought into association with Solomon, and while aiding him on certain occasions, notably in building the temple, he is regarded also as the cause of the offenses which history attaches to Solomon.

**ASMONEANS.** See HASMONÆANS.

**ASNIERES,** ä'nyâr'. A northern suburb of Paris, France, 3 miles distant, on the left bank of the Seine (Map: Paris). It is the chief town of its canton, an important railway junction, has domestic industries, and is a favorite summer pleasure resort of the Parisians. It is the headquarters of Parisian yachtsmen, and regattas are held here in July, August, and September. Pop., 1896, 24,317; 1901, 31,336; 1906, 36,482; 1911, 42,583.

**ASNYK,** äs'nĕk, ADAM (1838–97). A Polish poet and dramatist, born at Kalisch. He studied medicine at Warsaw and Breslau, but finally turned to philosophy and took his degree at Heidelberg in 1866. During several years he was a political exile for participation in the insurrection of 1863, and about that time he began to publish poetry. He resided at Cracow from 1870 till his death. Several volumes of his "poetical" work appeared under the pseudonym of "El—y," and have given their author a high place in Polish lyric literature. As a dramatic writer, he produced, among other successful pieces, *Cola Rienzi; The Jew; The Friends of Job,* and a tragedy dealing with Lithuanian history, called *Kiejstut.*

**AŚOKA,** ä-shō'kà, written also **AÇOKA,** ä-shō'kà, **ASHOKA.** A renowned King of early India, famous as the patron of Buddhism, to which he stands in a similar relation to that of Constantine to Christianity. His full name was Aśoka Vardhana. He was the son of Bindusāra Amitraghāta, of the Maurya line, and he ascended the throne of Magadha (modern Behar) about 264 B.C., as inheritor of the northern empire which his famous grandfather, Chandragupta, or Sandrocottus (q.v.), the contemporary of Alexander the Great, had founded. Through conquest he extended his power by bringing the kingdoms of Bengal and Orissa into his vast domain. At first he seems to have been of a cruel and savage nature, as is shown by his causing his own brothers to be assassinated when he succeeded to the crown; but he appears to have experienced a change of heart or to have undergone a transformation when he was converted from Brahmanism to Buddhism. He devoted himself zealously to spreading the faith of the Buddha, convoking great Buddhist councils and making Buddhism the state religion of his extensive realm. The numerous edicts which he caused to be inscribed upon rocks and pillars in various parts of India bear witness to his religious devotion and show his loving care for animals as well as for man; and they entitle him to the proud name, "Beloved of the Gods," by which he designated himself. They also shed much light upon the wisdom and justice of his administration and upon the condition of India at the time when he reigned. One column, which was discovered as recently as 1896, is especially interesting, because we learn from it that he had caused it to be erected upon the spot where, according to tradition, the Buddha was born. Aśoka died about 228 B.C. Consult: V. A. Smith, *Aśoka, the Buddhist Emperor of India* (London, 1901); *Edicts of Aśoka* (1909); E. Senart, *Les inscriptions de Piyadasi* (Paris, 1881–86); Hardy, *König Açoka* (Mainz, 1902).

**AS'OLAN'DO: FAN'CIES AND FACTS.** A volume of poems by Robert Browning, published on the day of his death, Dec. 12, 1889.

**ASO'PUS** (Gk. *'Ασωπός, Asōpos*). The god of the river Asopus. By Metope, daughter of the river god Ladon, he had numerous daughters, through whom he became the ancestor of many of the heroes of Greece. When his daughter Ægina was carried away by Zeus, Asopus pursued, but was slain by a thunderbolt.

**ASO'TUS.** A character in Jonson's *Cynthia's Revels;* a hanger-on of Amorphus, whom he slavishly imitates.

**ASP.** The name applied in Europe to the *Vipera aspis,* a venomous serpent distributed all over southern Europe and the Alps region. It is the only poisonous snake that is found as far north as Sweden. The word *bethen* of the Bible, usually translated 'asp,' and the *aspis* of the Greeks (*ἀσπίς*) and the Romans, probably referred to several venomous snakes; at any rate, several poisonous serpents are found in Palestine and Egypt, but in some cases the biblical context seems to show that the much-dreaded cobra (*Naja haie*) of Egypt and Cyprus is referred to. This serpent is represented in the hieroglyphics of ancient Egypt, and is the snake which, after the poison fangs have been extracted, is used by modern Egyptian jugglers in their snake dances. It has loose skin on the neck that can be dilated into a hood much like that of the cobra di capello of India, but it does not have the spectacled markings. (See COBRA.) The asp of Cleopatra fame was probably the small-horned viper (*Aspis hasselquistii,* or *Cerastes cornutus*). Several other vipers are sometimes called asps, especially the south African puff-adder (q.v.).

**ASPAR'AGINE** ($NH_2$)CO.CH($NH_2$).$CH_2$ COOH. A crystalline substance which exists ready formed in common asparagus and in many other plants. Chemically it is, as the structural formula shows, an amide of asparitic (amidosuccinic) acid; like the amide of any other acid, it yields the acid itself when boiled with dilute mineral acids or with alkalis. Asparagine is readily obtained from the expressed juice of the young shoots of asparagus, young vetches, etc., which, after filtration and evaporation to a sirup, soon deposits it in crystalline form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste. That asparagine plays an important part in the physiology of plants is obvious from its wide distribution. It occurs in plants as a product of decomposition of protein.

**ASPAR'AGUS** (Gk. *ἀσπάραγος, asparagos,* or *ἀσφάραγος, aspharagos*). A genus of plants of the family Liliaceæ. The species of this genus are herbaceous or shrubby plants, natives chiefly of the south of Europe and of Africa. The most widely diffused species is the common asparagus (*Asparagus officinalis*), a native of Europe, which grows on the banks of rivers and on the seashore, in meadows and bushy places, especially in sandy soils, occurring in a few places in Great Britain, and is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, form a much-esteemed article of food. These sprouts contain a peculiar crystalline substance called *asparagine* (q.v.). The peculiar odor asparagus imparts to the urine is due to methylmercaptan—a sulphur body—liberated when it is digested. The thick and tender kinds of asparagus are most esteemed for the table and much used, both fresh and canned. Asparagus has a very high water content, 94 per cent on an average, and so a low food value, resembling other green succulent vegetables in this respect. It contains a little carbohydrate and protein and a very little fat and ash. It is prized for its flavor and wholesomeness. It can be cooked in a great many ways, but is most commonly boiled and served hot, with butter or a sauce, or cold as a salad. It should be cooked only until tender, inasmuch as overcooking spoils the flavor and color. The preference for blanched or for green asparagus is a matter of taste, not of actual quality. Asparagus has been much increased in size and considerably altered in general appearance by cultivation, being seldom more than a foot high in its wild state, and not much thicker than a goose quill, whereas it is now obtained more than half an inch in diameter, with a stem 4 or 5 feet in height. Asparagus is grown from seed. When the plants are one year old, they are transplanted to rows from 2½ to 5 feet apart, according to method of cultivation, and set at distances varying from 1 to 2 feet in the row. The plant will grow on almost any soil, but gives the best results on deep, rich, sandy loams, with a south or east exposure. It requires heavy manuring each year if large yields are desired. Male plants are held to be more productive than female. The first sprouts may be gathered when the plants are three years old, but a full crop is not to be expected until the spring of the fourth year. Beds once established and cared for endure many years. The raising of asparagus for the market has become an important industry near the larger cities of Europe and the United States. Asparagus is sometimes forced out of season. For this purpose mature roots may be placed under the greenhouse benches or in pits, cellars, or almost any place where there is sufficient heat. But little light is needed. The asparagus shoots thus obtained are formed from the reserve material already stored in the roots. Roots thus forced once are exhausted and thrown away.

In the open field, forcing trenches are sometimes dug between the rows, and filled with fermenting manure. The trenches may also be heated with hot-water pipes and with loose steam. The latter method has proved very effective at the Missouri Agricultural Experiment Station. Another method of forcing is to place sashes over the plants. At the Cornell Experiment Station, in New York, a low house was built over the bed, the frame of which was made of steam pipes and the top covered with canvas. Asparagus plants forced in place by any of these methods recuperate after one or two years, when they may be again forced. The young shoots of several other species of asparagus are also eaten, as those of *Asparagus tenuifolius, Asparagus acutifolius,* and *Asparagus albus,* natives of the south of Europe; the last of which is much used in Spain and Portugal as a salad, in soups, and as a boiled vegetable. On the other hand, the sprouts of the bitter asparagus (*Asparagus scaber*), which is very similar to the common asparagus, are not edible, on account of their bitterness. There are a number of species of asparagus grown in greenhouses as ornamentals. See LILIACEÆ; FLOWERS; also Plate of YAM, ETC.

**Asparagus Diseases.** The principal disease of which this plant is subject is a rust caused by the fungus *Puccinia asparagi.* The disease has been known for many years in Europe, but did not appear in the United States to a threatening degree until 1897. The leaves and stems are attacked and become covered with red blotches. Varieties seem to differ in the degree of susceptibility to disease, the variety Palmetto having been found fairly resistant in the East. In California the thorough application of sulphur has proved an efficient treatment.

**ASPARAGUS IN'SECTS.** Cultivated asparagus is remarkably free from insect pests. It is, however, preyed upon by two small chrysomelid beetles (*Crioceris asparagi* and *Crioceris duodecim-punctata*), the former introduced from Europe to Long Island, N. Y., about 1856, and the latter more lately. The common one is nearly half an inch long. "The head is black, the prothorax reddish, often with two black spots above; the elytra are yellow, with a sutural (median) stripe of black, from which stripe extend two black bands dividing the yellow part of each elytron into three portions. . . . Beneath, the beetle is nearly or entirely shining black." These beetles, as adults, attack the young growing shoots, and as larvæ destroy shoots, berries, and seeds. The heads of the asparagus should be cut off, after the eggs are laid, and boiled. Wild asparagus in the neighborhood of the cultivated beds should also be destroyed. Several other beetles are more or less injurious to this plant in Europe. The larvæ of several moths feed upon the plant, as do many species of plant bugs and aphides, but none does persistent damage. Consult Chittenden, United States Department of Agriculture, *Year-Book* (Washington, 1896), and *Bulletin No. 10,* Division of Entomology, United States Department of Agriculture (Washington, 1898).

**ASPARAGUS STONE.** See APATITE.

**ASPASIA,** ăs-pā'shĭ-ă (Gk. 'Ασπασία) (c.440 B.C.). A celebrated woman of ancient Greece, noted for her genius, beauty, and political influence; daughter of Axiochus, and born at Miletus. The circumstances of her removal to Athens are unknown, but the beginning of her connection with Pericles dates from about 460 B.C. Pericles finally divorced his first wife by her own consent and married Aspasia, by whom he had a son, also called Pericles. The real status of Aspasia in Athenian society has been a subject of much difference of opinion. The fact that at Athens marriage with any woman of foreign birth was held to be incomplete, and the offspring of such a union illegitimate, may have contributed to the notion that Aspasia was a courtesan. She was without doubt a woman of intelligence and wit; and this fact, combined with her freedom from the restraints which regularly confined the activity of women at Athens, naturally gave her prominence and brought upon her not a little obloquy. After her marriage with Pericles her house became the rendezvous of men of learning and distinction. The comic writers found her a convenient butt for their satire. Pericles is said to have been greatly influenced by her, but we can hardly consider as serious the charge that she was the cause of the Samian and the Peloponnesian wars. On one occasion the comic poet, Hermippus, charged Aspasia with impiety, but she was successfully defended by Pericles himself. When the two sons of Pericles by his first marriage died, Pericles obtained from the state the rights of full citizenship for his son by Aspasia. After the death of Pericles Aspasia married a sheepowner, with whom she lived but a single year and by whom she had one son. Her further career is unknown, but she continued to live in Athens and died there.

**ASPASIA,** or **ASPATIA.** The heroine in Beaumont and Fletcher's *Maid's Tragedy*, whom Amintor makes love to, and then deserts.

**ASPASIA,** THE YOUNGER. A Phocean, at first, according to Plutarch, called Milto. She became the lawful wife of Cyrus the Younger, who named her Aspasia, perhaps after the wife of Pericles. Upon the death of Cyrus she was claimed by his brother Artaxerxes, with whom she lived until his son Darius was designated as his successor. Darius then claimed Aspasia, according to the custom of the Persians. Artaxerxes, to thwart Darius' desires, made her a priestess of Artemis at Ecbatana. In revenge Darius formed a plot to assassinate his father, but was detected and put to death.

**ASPE,** ăs'pā. A town of Spain, in the province of Alicante, 16 miles west of the town of Alicante (Map: Spain, E 3). It manufactures oil, spirits, and soap, and coal is mined. Near it is Mount Rollo, famous for its marble quarries. Pop., 1900, 7927; 1910, 7961.

**ASPE,** ăsp. A picturesque valley in the French department of Basses-Pyrénnées, extending from the Spanish border to Aloron. It contains numerous mineral springs. The Pico d'Aspe is 8880 feet high.

**AS'PECTS** (Lat. *aspectus*, a sight, appearance; from *ad*, to + *spicere*, to look). In astronomy and astrology, certain positions of planets with respect to one another, as seen from the earth. In the days of Ptolemy there were five aspects—conjunction, indicated by the symbol (☌), sextile (⚹), quartile or quadrate (□), trine (△), opposition (☍). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile or quadrate when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these aspects great influence over the fate of individuals and of nations. Later astrologers added other aspects, based on further subdivision of the circle. In addition to the five ancient aspects, Kepler at one time made use of semisextile (30°), semiquintile (36°), quintile (72°), sesquiquintile (108°), sesquiquadrate (135°), and biquintile (144°), but as the last three did not correspond to an exact division of the circle, they came to be regarded as having negligible influence and were consequently abandoned. Only two of the terms, *conjunction* and *opposition*, are now in general use.

**AS'PEN,** or TREMULOUS POPLAR, *Populus tremula*. (See POPLAR.) A tree which grows plentifully in Europe and in Siberia, belonging to the family Salicaceæ. It is a native of Great Britain and is frequent in Scotland, where it is found even at an elevation of 1500 feet above the sea. It has received the specific name *tremula* from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen leaf has become proverbial. The leaves are nearly orbicular, but are broadly toothed, so as almost to exhibit angles. The footstalks are compressed, and in part to this compression is due the sensitiveness of the leaves to the breeze. The aspen grows quickly, with a straight stem, reaching to a height of from 50 to 80, or even 100 feet. In unfavorable situations it becomes dwarfish. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning lathe, and especially for manufacture of troughs, trays, pails, etc. It is deemed excellent for arrows. If the stem is peeled and allowed to dry before it has been cut down, the wood becomes harder, and it may then be used as timber for the interior of houses. On this account the tree is of great importance in many districts, the more so as it succeeds in any soil, although it prefers one that is moist and gravelly. The bark contains considerable quantities of the glucoside called salicin. The charcoal made from the tree is sometimes used in the manufacture of gunpowder. *Populus tremuloides*, a similar species (according to some, a mere variety of the ordinary aspen), is a native of North America, and is called the American aspen, commonly, "quakin' asp'." This is one of the widest-distributed trees of North America. It is found in Labrador and Alaska, and again as far south as Pennsylvania, Missouri, and even New Mexico. It lives in California also. Very similar also is another North American species, *Populus grandidentata*, which has a more restricted range. The wood of both these species is extensively used in the United States for the manufacture of wood pulp. *Populus grandidentata* has given rise to a number of forms with pendulous branches that are extensively grown as ornamentals. See also POPLAR.

**AS'PEN.** A city and the county-seat of Pitkin Co., Colo., 25 miles west of Leadville, on the Denver and Rio Grande and the Colorado Midland railroads (Map: Colorado, C 2). It has an altitude of 7900 feet. Rich silver and lead mines are located here. Aspen was settled 1879–80 and incorporated in 1881. It is gov-

erned by a mayor, elected biennially, and a council, composed of the mayor and four aldermen. Pop., 1890, 5108; 1900, 3303; 1910, 1834.

**AS'PER.** A character meant to portray the author in Ben Jonson's *Every Man Out of His Humour*.

**ASPERGIL'LUM.** See WATERING-POT SHELL.

**ASPERN,** äs'pĕrn, or GROSS ASPERN. A village of Austria, on the left bank of the Danube, 5 miles east-northeast of Vienna. Pop., about 1400. This village and the neighboring one of Essling are celebrated as the scene of a sanguinary battle in the summer of 1809, between the French army, under Napoleon I, and the Austrians, under Archduke Charles. After the battle of Eckmühl, in which the Austrians were defeated, the Archduke retired to the left bank of the Danube, leaving the road to Vienna open to the French. On May 12, 1809, the French army entered Vienna, when the Archduke concentrated his forces on the opposite bank of the river. Napoleon threw bridges over the river, from the island of Lobau, which he had occupied, and on the 21st the French army began crossing to the attack and seized Aspern and Essling. The Austrians at first seemed to give way; but when about half the French had crossed the river, they returned to the charge and almost surrounded the enemy in the narrow plain between the two villages. Here ensued the battle of Aspern, a terrible conflict, the grand object of the contending hosts being the possession of the villages, of which Aspern was thrice lost and retaken by the Austrians. At the close of the day it remained undecided, but next morning it was renewed with fury on either side. The French had almost snatched the victory, when fresh Austrian troops marched on the field and saved the day. After terrible slaughter Napoleon ordered a retreat, and his shattered ranks retired to the little island of Lobau, in the middle of the river, whence they afterward slowly withdrew to the right bank. The loss on the side of the Austrians was given at 4000 killed and 16,000 wounded; that of the French at double that number. Marshal Lannes, the most daring among the French generals, was among the slain. Both the villages were reduced to heaps of ruins. The French called this the battle of Essling, while the Austrians gave it the name of Aspern.

**ASPER'ULA.** See WOODRUFF.

**AS'PHALT,** or **ASPHAL'TUM** (Gk. Ἄσφαλτος, *-ον, asphaltos, -on,* a loan-word of uncertain origin). A name applied to certain natural bitumens composed of unsaturated hydrocarbons (see HYDROCARBONS; CARBON COMPOUNDS) and their sulphur derivatives, together with some nitrogenous substances. Asphalt is probably formed from lighter hydrocarbons by condensation and polymerization in the presence of sulphur, and possibly under its influence. That the formation of asphalt is still going on in nature is shown by the continual evolution of sulphuretted hydrogen in the asphalt deposits of Trinidad and Bermudez. While there is a great similarity in natural asphalts, extending to both physical and chemical characters, we may find them in a great variety of forms and conditions of occurrence. They may be free bitumens, either liquids, or viscous, or brittle solids, containing little or no mineral matter; or they may be mixtures in various proportions, more or less intimate, of the bitumens with inorganic matter or with both inorganic and organic matter.

A *liquid bitumen,* under the name of "mineral tar," was first found at Bechelbronn in Alsace many years ago, and was studied by Boussingault, who described it as a viscid, tarry liquid of bituminous odor, having a specific gravity of 0.966, and containing, besides hydrocarbons, both sulphur and nitrogen. Liquid bitumens, known as malthas, are also found in California: in Kern, Ventura, and Santa Barbara counties. Those from California which have been chemically examined invariably contain nitrogen, present in the form of basic hydrocarbons. One of the most interesting of the occurrences of liquid bitumens is that at Las Conchas mine, 13 miles east of Santa Barbara, Cal., where there are numerous beds of shale, which appear to be saturated with it. A well sunk 400 feet in this material continues to ooze liquid asphalt at all points. The shale itself is not, however, worked to obtain the substance, because on top of the shale is an immense bed of sea sand, the locality being immediately on the beach, and this sand acts like a sponge in taking up and holding the liquid bitumen. After clearing off the surface soil, this beach sand has been exposed for considerable distances, and it is then dug up and transported to the factory, where it is treated with hot water and the bitumen allowed to rise to the surface, from which it is then skimmed off; the sand, being in this treatment completely cleansed, is thrown back upon the beach.

More important than the liquid asphalts, however, are the solid asphalts. The purest of the solid asphalts are sometimes known as "glance pitch" or gum asphaltum. Prominent among them is gilsonite, which is found in the Uintah Indian reservation, in Wasatch and Uintah counties, Utah. The purity of this product (some 90 to 98 per cent soluble in carbon disulphide) is such that it finds larger application in the manufacture of varnishes and insulating compounds than in paving and building construction, for which the commoner asphalts are generally used. This glance pitch is extremely brittle and friable, crumbling easily between the fingers, and has a bright lustre like anthracite coal. Notable quantities of this solid, relatively pure asphalt, are also found in Cuba, but because of its brittleness it is not of the same practical value for paving purposes as the softer, though less pure, varieties in common use.

Of the *solid asphalts* of commercial importance, by far the best known is asphalt from the island of Trinidad. Near the western border of the island is the so-called "lake." situated at an altitude of about 130 feet above the ocean and one mile from the shore of the Gulf of Paria. This lake is a level tract, nearly circular in shape, and about 114 acres in area, the surface of which shows a brownish material of a somewhat earthy appearance, sufficiently hard to bear the weight of carts and animals, moving across it, yet so plastic that excavations 15 feet in depth will be filled up and leveled in the course of a few months by the flow of adjacent material. This lake undoubtedly represents the crater of an extinct mud volcano, as the borings indicate that it is saucer-shaped and of greater depth toward the centre, where borings have shown uniformity of material to a depth of 78 feet. The amount of asphalt in the lake, judging from the excavations and depth indicated, must be about 6,000,000 tons. However, at some time in the past the asphalt very probably overflowed

the rim of the crater in many directions, so that extensive deposits of what is known as "land pitch" are now found all the way from the borders of the lake to the sea. This latter material, however, is not only of a more earthy character because of the included mineral matter, but has become more dry, presumably by long evaporation, and, therefore, is inferior for paving purposes to the tougher and more tenacious material known as "lake pitch." In the crude state, the Trinidad asphalt shows about 40 per cent of bitumen, 34 per cent of earthy matter, 9.3 per cent of organic non-bituminous matter, and 16.5 per cent of water. After refining, the water is eliminated and the bitumen is raised to about 60 per cent in amount. The mineral matter of this Trinidad asphalt is very finely divided, largely silicious, and not objectionable when the asphalt is to be used for paving purposes or the manufacture of mastic.

A second important natural asphalt of semi-solid character is that known as Bermudez asphalt, brought from the province of Bermudez in Venezuela, where it occurs near the coast in a large expanse of marsh, not entirely unlike the Trinidad lake, although at Bermudez there is no distinct indication of a crater. Bermudez asphalt contains 2.6 per cent of mineral matter and over 90 per cent of bitumen. It is, therefore, purer than Trinidad asphalt, containing less non-bitumen. It is of great value for paving purposes because of the plastic character of its bitumen as contrasted with the material of the glance pitch referred to above.

Considerable deposits of natural solid asphalts occur in the United States, notably in Indian Territory and on the Pacific coast. One of the best-known deposits in California is at La Patera, 12 miles west of Santa Barbara, where a rock asphalt is found containing on an average 60 per cent bitumen as it is mined, and a residue of fine silica free from clay and organic matter. Because of this relative purity of the mineral matter, it is possible to extract the bitumen from the rock after crushing, by the action of solvents, and by the recovery of these to obtain a solid asphalt in a very pure state.

In addition to these varieties of solid natural asphalt, there are natural mixtures of bitumen with large quantities of mineral matter. These may be classified as asphaltic limestones and asphaltic sandstones. The limestones are much better known and perhaps more widely distributed. They constitute what has long been known in Europe as "asphalt," extensive deposits being found, for instance, in the valley of the Rhône in France, in Switzerland, in Sicily, and at Hanover in Germany. These deposits form beds of fine, amorphous limestone naturally impregnated with bitumen, and have furnished the asphalt pavements of the various European cities. We may mention among them the asphaltic limestones of Val de Travers in the canton of Neuchâtel, Switzerland, the Seyssel on the lower Rhône, a few miles above Lyons in France, Ragusa in Sicily, and the Limmer and Vorwohle mines in Germany.

These bituminous limestones contain from 5 to 15 per cent of bitumen, and from 67 to 91 per cent of calcium carbonate. The amount of bitumen in them is sufficient to cause the powdered rock to soften somewhat when heated, and they can therefore be utilized directly, in the form of heated powder, for laying asphalt pavements. In the United States a similar deposit of limestone, largely fossil in character, is found in Uvalde Co., Texas. It contains from 15 to 25 per cent of bitumen. It has been brought into commerce under the name of "lithocarbon," when extracted for a variety of purposes, such as the manufacture of insulating material. Asphaltic sandstones are found on the coast of California and in numerous sections of Colorado, Utah, and New Mexico, containing from 15 to 20 per cent of bitumen. Still richer bituminous sandstones have in recent years been found in Kentucky.

**Artificial Asphalts.** Many natural petroleums are said to have an asphalt base. This means that the residuum, instead of containing paraffin, as is generally found in petroleum, contains a product which has many of the characteristics of a maltha or liquid asphalt. Thus the California petroleums yield malthas which can hardly be distinguished from the naturally occurring liquid asphalts. By heating these natural liquid asphalts with sulphur, the process of change whereby the natural solid asphalt was formed in nature is imitated, and artificial solid asphalts are obtainable. Large quantities of such solid asphalts, artificially prepared, are made from California and Texas petroleum. Again, by passing oxygen through heavy petroleum oils, a solid product known as *Byerlite* has been formed, which is a variety of artificial asphalt, although differing considerably from that produced by the action of sulphur. Finally, by the distillation of a mixture of fish remains and wood, and redistilling the resulting oil, William C. Day obtained a product which he named "artificial gilsonite" because of its close resemblance in both physical and chemical characters to natural gilsonite or glance pitch.

**Technical Uses of Asphalt.** As already stated, the purest varieties of asphalt are extensively used in the manufacture of asphalt varnish. For this purpose glance pitch and gilsonite are preferably taken, although a thoroughly refined Trinidad or Bermudez asphalt is also available. The product is a combination of asphalt, turpentine, and linseed oil, combined in varying proportions, such as 3 parts of asphalt to 4 of boiled oil with 15 to 18 of turpentine. These varnishes are very extensively used in coating metal and wood. A refined asphalt usually mixed with some petroleum residuum is used for saturating felt, the process being carried out with the aid of machinery, and a paint or varnish of similar composition is generally applied subsequently, after the asphalt felt is in place. The asphalt felting possesses an advantage over simple coal-tar felting, in that it does not become brittle under the influence of heat or with age.

Insulating paints are also made quite extensively from some of the extracted bitumens admixed with various substances, so as to produce a hard product corresponding to ebonite.

By far the most important application of asphalt, however, at the present day, is in the paving industry. We may distinguish here between sheet asphalt, in which the asphalt composition is spread so as to form large continuous sheets, as in street-paving, and asphalt block-paving, in which blocks of asphalt composition are first manufactured by machinery. The use of asphalt for street paving dates back to 1838, when sidewalks were laid in Paris with the bituminous limestone from Seyssel and Val de Travers, and, as before stated, almost all the

European asphalt-paving has been done with this asphaltic limestone. In the United States, however, an asphalt-paving composition is made up containing about 15 per cent of an asphaltic cement made by incorporating a small quantity of free liquid maltha or petroleum residuum with a refined solid asphalt, to which is then added some 60 to 70 per cent of clean sand, and 10 to 25 per cent of pulverized limestone. This makes the surface coating, and is usually put upon a prepared concrete foundation and smoothed and rolled with heavy road engines. Asphalt blocks are made from crushed stone and refined solid asphalts compacted and pressed into forms by suitable briquetting machinery. Mastic is another form of asphalt pavement used largely for the covering of sidewalks and lining of areas, and is manufactured of asphaltic limestone, such as the Seyssel or Neuchâtel, with which about 8 per cent of its weight of refined Trinidad asphalt has been incorporated, heated, and cast into blocks. When ready for use these blocks are broken up and again heated with the addition of a mixture of refined solid asphalt with petroleum residuums and then brought to the proper consistency by the addition of a certain proportion of sand and fine gravel. Mastic is poured hot upon the prepared foundation and spread by the aid of wooden trowels and afterward smoothed with wooden implements.

In 1911, 360,004 tons of asphalt and bituminous rock, valued at $3,828,751, were produced in the United States. The amount imported in the same year was 165,288 tons, valued at $789,236.

PRODUCTION OF ASPHALT, 1911, BY STATES

| State | Short tons | Value |
|---|---|---|
| California | 190,945 | $2,104,421 |
| Oklahoma * | 82,387 | 420,931 |
| Texas | 55,826 | 786,785 |
| Utah | 30,846 | 516,614 |
| Total | 360,004 | $3,828,751 |

* Includes a small production for Illinois and Kentucky.

Consult: Delano, *Natural Asphalt and Mineral Bitumen* (New York, 1893); Howard, *Natural Asphaltum and its Compounds* (Troy, N. Y., 1894); Richardson, *On the Nature and Origin of Asphalt* (London, 1899); Klein and Peckham, *Asphalt Paving* (Report of the Commissioners of Accounts of the City of New York, 1904); Köhler, *Die Chemie und Technologie der natürliche und kunstliche Asphalte* (Braunschweig, 1904); Richardson, *Modern Asphalt Pavement* (New York, 1905; 2d ed., 1908); and *Asphalt Construction for Pavements and Highways* (New York, 1913); Eldridge, "The Asphalt and Bituminous Rock Deposits of the United States," *Twenty-Second Annual Report of the United States Geological Survey*, part i (Washington, 1901). See PAVEMENTS; DAMS AND RESERVOIRS; ASPHALTIC COAL; BITUMEN; BITUMINOUS LIMESTONE; BITUMINOUS SANDSTONE; PETROLEUM.

**ASPHAL'TIC COAL**, or **ASPHAL'TITE.** Solid forms of asphalt, originally derived from petroleum, which, through loss of their oil content, have assumed an appearance analogous to that of glance coal. Asphaltic coal occurs usually in fissures, into which it has flowed while in a liquid or viscous condition. Such fissure deposits have been found in rocks of Devonian, Carboniferous, and Tertiary Age, and the contained material has received various names in different portions of the country. The chief uses of these asphaltic coals are as bases for varnishes, as insulators, and formerly, to a large extent, as gas-enrichers. The more important varieties, with the localities where mined, are: Albertite, Albert Co., N. B., Canada; gilsonite and uintahite, in the Uintah Mountains of Utah; grahamite, originally from Wood Co., W. Va., but subsequently found in Colorado, Texas, and Mexico: wurtzilite, in Utah.

An allied substance is ozocerite, or mineral wax, obtained in Galicia (Austria) and in Utah. (See under special heads.) For descriptions of the various deposits and theories regarding the origin of the asphaltic coals, the reader is referred to the following papers: Bailey and Ells, "Report on the Lower Carboniferous Belt of Albert and Westmoreland Counties, New Brunswick," in *Geological Survey of Canada, Report of Progress, 1876–77* (Montreal, 1878); Peckham, "The Probable Origin of Albertite and Allied Minerals," *American Journal of Science*, 2d series, vol. xlviii (New Haven, 1869); Lesley, "On an Asphaltic Coal Vein in West Virginia," *American Philosophical Society, Proceedings, 1865* (Philadelphia, 1865); Wurtz, "On Grahamite," *American Journal of Science*, 2d series, vol. xlii; Blake, "Uintahite, Albertite, etc.," *Transactions of the American Institute of Mining Engineers*, vol. xviii (New York, 1890); Eldridge, "The Uintahite (Gilsonite) Deposits of Utah," *Seventeenth Annual Report of the United States Geological Survey*, part i (Washington, 1896); Taff, "An Albertite-like Asphalt in the Choctaw Nation, Indian Territory," *American Journal of Science*, vol. clviii (New Haven, 1899); Taft and Anderson, *United States Geological Survey*, Bulletins 285 (1905) and 380 (1908).

**AS'PHODEL** (Gk. *ἀσφόδελος, asphodelos*, king's spear, asphodel), *Asphodelus*. A genus of plants belonging to the family Liliaceæ. The roots of the asphodels are fleshy and thick. The species are not very numerous and are mostly natives of the countries around the Mediterranean. The yellow asphodel (*Asphodeline lutea*) and the white asphodel (*Asphodelus albus*) have long been known as garden flowers. The yellow asphodel has an unbranched stem 2 to 3 feet high, much covered by the sheathing bases of the long narrow leaves. The leaves of the white asphodel are all radical, and its flowers are in branched clusters. Both species flower about the time when spring passes into summer. *Narthecium ossifragum*, abundant in the moors of England and elsewhere in Europe, is the well-known bog asphodel. In the United States *Narthecium americanum* is known by the same name. False asphodel is a name given to some of the species of *Tofieldia*. All these plants are rather closely related. The asphodel often referred to by poets is *Narcissus Pseudo-Narcissus*. For illustration, see ARAUCARIA.

**ASPHYX'IA** (Gk. *ἀσφυξία*, a stopping of the pulse, from *ἀ, a*, negat. *σφύξις, sphyxis*, pulse). A condition brought about in oxygen-breathing animals when any obstacle prevents the entrance of air into the pulmonary vesicles, and unconsciousness or death occurs. Aquatic animals may be asphyxiated either by depriving the water they inhabit of oxygen or impregnating it with noxious gases. Asphyxia may de-

velop suddenly, by strangulation, or throttling, by the lodgment of foreign bodies in the larynx or trachea, or spasm of the glottis, or growths in the same; or gradually as in close rooms or mines when the supply of oxygen is cut off; or by the inhalation of noxious gases, anæsthesia, or poisoning by strychnine or curare; and in many other ways. The most frequent cause is drowning.

In acute asphyxia there is an increase of carbon dioxid in the blood, which first stimulates the respiratory centre in the medulla and finally paralyzes it. Respiratory efforts are at first increased and then slowly cease; the blood pressure falls; the right side of the heart becomes engorged with blood, and unconsciousness takes place in two or three minutes. In the early stages the face becomes livid; later it becomes pale; the mucous membranes and skin become bluish, and the fine blood vessels injected. Small hemorrhages may occur. The heart, which at first beats strongly, becomes weaker and weaker and finally ceases to beat, and death occurs. In man, this occurs in from a minute and a half to five minutes. Some persons, no doubt, as pearl divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood vessels by which they are enabled to remain under water for a long time. In the treatment of asphyxia the cause must be removed immediately, if possible. Tracheotomy saves many lives when the upper air passages are obstructed. In laryngeal diphtheria the insertion of a tube into the larynx is a common practice.

Ordinary restorative measures may be employed with hopes of success at a very long period after apparent death. Some have recovered after being submerged in water for two hours. The object of all methods is to supply fresh air to the lungs and to force the blood from the engorged right side of the heart—in other words, to supply an artificial respiration and an artificial circulation.

**Asphyxia neonatorum.** This is a condition of suspended animation in new-born infants, due to compression of the umbilical cord, or other obstetrical accident, cutting off the circulation which supplies the fœtus with oxygen, before natural respiration begins. Infants may be revived by stimulation and artificial respiration if the heart has not stopped beating. See RESPIRATION, ARTIFICIAL.

**ASPHYX'IANTS** (for derivation, see ASPHYXIA). When applied to particular munitions of war, the term refers to shells or other projectiles containing chemical substances designed to produce a suffocating or poisonous effect. The Chinese have, from the earliest times, availed themselves of this device, and in their "stink-pot" secured such results. The use of asphyxiants has always been discouraged by the more enlightened authorities, both military and civil; so much so that The Hague Peace Conference of 1899 strongly condemned their employment. Lyddite shells were used by the British during the Anglo-Boer War of 1899–1902, and shimose and similar shells, opaque powders and hand grenades by both sides in the Russo-Japanese War. While not strictly asphyxiants, they render untenable a larger area of ground than would be accomplished by the projectile itself. These shells in exploding give rise to fumes and smoke which serve the double purpose of enabling the gunners to locate the point where they strike and obscuring the sight of the forces among whom they fall. Other compositions that may be used are designed to burn fiercely, igniting whatever inflammable material they may come in contact with, such as the interior fittings of ships, forts, or other buildings.

**AS'PIC** (Fr. probably from *aspic*, an asp, alluding to its coolness). A savory meat jelly molded into a regular form and containing portions of fowl, game, fish, and the like, usually with hard-boiled eggs and sliced pickles. The term is used also in poetry for any venomous snake like the asp or viper. In botany it is sometimes used to designate the spikenard (*Lavandula spica*).

**AS'PINWALL.** See COLON.

**ASPINWALL.** A borough in Allegheny Co., Pa., about 3 miles northeast of Pittsburgh, on the Pennsylvania Railroad and on the Allegheny River. It is essentially a residential place. Aspinwall is governed by a council of seven members, elected by the people. The water works and light plant are owned by the borough. Pop., 1900, 1231; 1910, 2592.

**ASPINWALL,** WILLIAM (1743–1823). An American physician, born at Brookline, Mass. He received his education at Harvard and studied medicine in Philadelphia. He acted as a surgeon in the Revolutionary army and subsequently practiced his profession at Brookline. He is remembered for having introduced vaccination in this country.

**ASPINWALL,** WILLIAM H. (1807–75). An American railroad builder. He was born in New York City, and as early as 1837 was a partner in the firm of Howland and Aspinwall, then one of the largest shipping firms in New York. In 1850 he retired from the firm and devoted his entire attention to building the Panama Railroad, the eastern terminus of which was named after him. He was also active in the formation of the Pacific Mail Steamship Company.

**AS'PIRATE** (Lat. *aspiratus*, breathed upon). The term is applied by philologists to certain sounds, especially in Sanskrit and Greek, such as *kh*, *gh*, χ (ch), θ (th), φ (ph), accompanied by a breathing. The term may also include the English *f*, *th*, which are more properly called breathings or spirants. Its application to the sounds *ch* and *h* is popular and is not recognized by specialists. See PHONETICS.

**AS'PIRA'TOR** (Lat. *ad*, to + *spirare*, to breathe). An apparatus for drawing off air or other gases. The simplest form of aspirator consists of a tight receptacle filled with water, provided with a stopcock at each end. With both cocks open, the escape of the water draws the gas into the receptacle. A similar instrument is used by surgeons to draw fluid from a cavity.

**AS'PIRIN.** Acetyl-salicylic acid. An unofficinal salicylate, thought to be more efficient than others and to cause less gastric disturbance because it passes through the stomach unchanged and liberates its salicylic acid in the intestine. It is a white powder, soluble in 100 parts of water. It is employed in rheumatism, gout, tonsilitis, pleurisy, chorea, neuralgia, and multiple neuritis.

**ASPÍROZ,** ȧs-pē'rōs, MANUEL DE (1836–1905). A Mexican statesman and diplomat. He was born at Puebla and graduated in 1855 at the University of Mexico. He fought in the war

against the French. Upon the capture of Maximilian he was appointed "fiscal" in the council of war chosen to try the Emperor. In this capacity he drew up the accusations and took the evidence against Maximilian. In 1867 he was appointed Assistant Secretary of State for Foreign Affairs in the newly established republic. From 1873 to 1875 he was Mexican Consul at San Francisco and in 1875 was elected to the Senate. He was professor of law in the College of Puebla from 1883 to 1890; again became Assistant Secretary of State for Foreign Affairs in 1890; and in 1899 succeeded Señor Romero as Mexican Ambassador to the United States. This post Aspíroz held for the six years preceding his death. Throughout his services in Washington his relations with the Austrian Ambassador were confined to official transactions, as the Austrian court held him responsible for the fate of Maximilian, the brother of the Emperor Francis Joseph. His works include *Código de extranjería de los Estados-Unidos Mexicanos* (1876) and *La libertad civil como base del derecho internacional privado* (1896).

**ASPLE'NIUM** (Gk. *ἀσπλήνον, asplēnon*, spleenwort, from *ἀ, a* euphonic + *σπλήν, splēn*, spleen). A genus of ferns of the family Polypodiaceæ. The species are numerous, there being about 200, widely diffused both in the Northern and Southern hemispheres. Many of them are of great beauty; and the small size of some recommends them to cultivators of ferns who find themselves much limited as to space. The species of this genus may be readily recognized by their free veins and their elongated sori, which are covered by the indusium. Some of the species bear the English name "spleenwort," as *Asplenium trichomanes, viride, adiantum-nigrum*, etc., having been formerly supposed efficacious in removing obstructions of the viscera. They have now fallen completely into disuse, but were at one time very much employed, principally in the form of sirupy decoctions. Some of them, as *Asplenium trichomanes* and *Asplenium adiantum-nigrum*, are frequently called "maidenhair spleenwort." At least a dozen species are met with in the eastern United States, of which the tall-growing ones, 1 to 4 feet high, *Asplenium filix-fœmina, Asplenium angustifolium*, and *Asplenium thelypteroides* are the best known. They are often cultivated, especially the first named, of which there are said to be at least half a hundred varieties. See Plate of FERNS.

**ASPRAMONTE**, äs'prä-mōn'tā. An Italian epic poem founded on the traditional defeat of the Saracens by Charlemagne near a place called in the legend "Asparamonte." Its author is unknown, but it was published in 1516, at Milan, a year after *Orlando Furioso*.

**ASPROMONTE**, äs'prō-mōn'tā (It. steep mount). A steep gneissic mountain ridge, over 30 miles long, near Reggio, in southwest Italy, abutting on the Strait of Messina (Map: Italy, K 9). It rises 6365 feet above the sea and is famous on account of the defeat and capture of Garibaldi by the forces of Victor Emmanuel, Aug. 29, 1862, which took place near it.

**ASPROPOTAMO**, äs'prō-pōt'ä-mō. See ACHELOUS.

**ASQUITH, HERBERT HENRY** (1852—). A distinguished lawyer and statesman, Prime Minister of Great Britain. He was born in Yorkshire, graduated from Oxford, and shortly afterward admitted to the bar. In 1887 Asquith was chosen to defend Mr. John Burns for his participation in the so-called riot at Trafalgar Square, and two years later he took a prominent part as counsel before the Parnell Commission on behalf of the Irish Nationalists. Becoming a member of Parliament, he quickly won the favor of Gladstone, and in 1892 he was promoted to the post of Home Secretary. His activity and effectiveness during the Home Rule debates made him the most conspicuous figure in the House. The position he assumed during the labor troubles of 1893 led to his appointment as an arbitrator of the strike of the London cabmen in 1894. In 1894 he drew up the bill providing for the disestablishment of the Church of Wales and supported that measure until it was rejected by the House. In 1895, with the defeat of the Liberals, he resigned his cabinet position, but continued in Parliament as a member of the Opposition. During the period of Conservative ascendency (1895–1905) his reputation steadily increased. Throughout the Boer War he stood steadily by the government, but with the raising of the protectionist banner by Chamberlain in 1903, he came forward as a defender of free trade. Among those who helped turn the Conservatives out of office in 1905 none took a more active part than he, and in the newly formed Liberal Ministry of Sir Henry Campbell-Bannerman he became Chancellor of the Exchequer, and, owing to the enfeebled health of the Prime Minister, the virtual head of the British government. The only bill of prime importance to be passed by the Upper House at this period was that providing for old-age pensions, a bill he presented in person as Chancellor of the Exchequer.

In 1908 Asquith became Prime Minister, and the formulation of the Liberal reform programme was immediately accelerated. The list of reform measures presented was a long one, including the famous Lloyd George budget (1909), the Parliament Act (1911), the Insurance Act, and the Irish Home Rule Bill. (See UNITED KINGDOM, *History*.) All of these proposals received Asquith's hearty approval, but the one which was passed under his especial guidance was the Parliament Act, which, in shearing the House of Lords of its veto power, virtually revolutionized the Constitution of Great Britain. The immediate cause of the passage of this act was the unprecedented rejection by the House of Lords of the budget of 1909; the underlying cause, the persistent refusal of the Lords for more than 50 years either to democratize their membership or to permit the House of Commons to enact long-delayed and much-needed social legislation.

Asquith, incensed by the Lords' rejection of the budget, obtained the King's consent to create a sufficient number of new peers to pass it and advised a general election, which took place in January, 1910. The government was sustained. The Commons again passed the budget and the Lords yielded their assent without a division. Asquith's opponents charged him with imposing upon a new and inexperienced King, overturning the work of the Magna Charta, and making himself simply a phonograph for radicalism. In addition, the more extreme members of the Labor party accused him of truckling, while the rage of the British "suffragettes," because of his attitude toward them, knew no bounds. Asquith finally consented to permit an equal-suffrage amendment to the government's electoral bill of 1912 to be voted upon, with the distinct proviso that said amendment should not be considered

a government measure. Owing to a technical ruling by the Speaker, it became necessary to withdraw the entire bill. Asquith was forthwith accused of betraying the suffrage cause, nor were his critics content with verbal attacks; on several occasions he was assaulted. Mr. Asquith is not noted for his oratory; his personality is said to be cold and unmagnetic; his statesmanship is held by many to be neither brilliant nor original. But for long he controlled with tact the discordant elements in his own party and placated the Labor members and the Irish Nationalists. In May, 1915, after 10 months of war in Europe, a cabinet crisis resulted from disagreements, and Asquith announced that, unless the Liberals would accept complete defeat, a coalition must be formed. This was done, eight Unionists being admitted. Consult Elias, *The Rt. Hon. H. H. Asquith, M.P.* (London, 1909). See UNITED KINGDOM, *History*.

**ASS** (AS. *assa*, Goth. *asilus*, Rus. *oselŭ*, Lat. *asinus*, probably of Eastern origin; cf. Heb. *āthōn*, she-ass), or DONKEY, when domesticated. A member of the family Equidæ and genus *Equus*. Two species are recognized—one Asiatic and the other African. Asses resemble zebras in size, the presence of callosities on the fore legs alone, and the shortness of the hairs of the mane and tail. They differ from the zebras in color, in not having stripes (except as hereafter mentioned), and in having somewhat longer ears. Their colors are pale, and their voices are between the neighing of the horse and the braying of a donkey.

**Asiatic Ass.** The Asiatic asses are distributed over all the arid interior of Asia, from Syria to eastern Mongolia and northern India, although more restricted now than formerly by the encroachments of civilization. They were well known to the ancients, who called them *onager*, *hemionus*, etc., to which more recent writers have added confusing native names. There appear to be three species (or varieties, as some taxonomists are disposed to consider them), of these wild asses. One is the kiang, koulan, or dziggettai (*Equus hemionus*), of Tibet and Mongolia, which is the largest, reaching 4 feet in height at the shoulders. It is dark-reddish in color and has a narrow black stripe from (and including) the mane along the spine to the top of the tail; it inhabits mountains from 15,000 feet elevation up to the snow line. In adaptation to this environment its coat is thick and furry. The second is the ghorkhar, or onager (*Equus onager*), frequenting the plains of northwestern India, Afghanistan, and Baluchistan, which is smaller and paler, sometimes silvery white, and has a comparatively broad dorsal stripe. The third variety (*Equus hemippus*), less well marked, is the wild ass of Persia and Syria. All are white underneath and are likely to show obscure bars on the lower legs. This last-named ass, no doubt, is that known to the writers of the Old Testament, who use it as a type of wildness and freedom—"Whose house I have made the wilderness, and the barren land his dwellings. . . . The range of the mountains is his pasture" (Job xxxix. 6, 7, 8). It is, indeed, one of the freest, most agile, and perhaps the swiftest of wild quadrupeds. The kiang will rush over broken, rocky ground in an astonishing manner, and those of the plains are beyond the power of a single horseman to overtake. "In the Bakanir Desert the foals are captured during the summer by parties of mounted Baluchis, who, by relieving one another, hunt them till they fall from sheer exhaustion, when they are taken and bound." These foals bring high prices in India, but are kept more as curiosities than for service. Another plan is to lie in wait at night by a drinking place and then run the animals down when heavy with water; but their keen scent and wariness make this difficult. Among the Persians the pursuit of asses with greyhounds is a favorite sport, and their flesh is esteemed by many and said to resemble venison. The kiangs of the mountainous wilderness of Tibet are less shy and will often approach one closely, with manifest curiosity, and even mingle with the horses of a train or enter the camp. "The food of these wild asses," says Lydekker, "consists in the lowlands of different kinds of grasses, which are frequently dry; but in Tibet it is chiefly composed of various woody plants, which form the main vegetation of these arid regions. In the hills to the west of the Indus these animals are to be found wandering pretty well throughout the year; but in the early summer, when the grass and the water in the pools have dried up from the hot winds, the greater number, if not all, of the ghorkars migrate to the hills.

**African Ass.** The best known of the two species of African wild asses, the Nubian ass, is usually called *Equus africanus*, but the terms *asinus* and *taeniopus* have also been applied to it. It is very distinct from the Asiatic forms. It is larger than the Asiatic species, reaching 4 feet 8 inches, or 14 hands, in height, and in color is always bluish or else creamy, with no tinge of red; the muzzle, throat, and belly are white; and a dark stripe extends from the shoulders along the spine to the tail, and also down the withers, while the legs are barred; but the last two markings vary greatly. The ears are very long, and the mane and tail hairs are comparatively short and indistinct in color. This species ranges throughout the open regions of northeastern Africa, from Somaliland to the Red Sea, and westward throughout the desert, where its food and habits are much like those of the ghorkhar, except that its small troops do not congregate into herds. Sir Samuel Baker describes them in western Abyssinia as follows:

"Those who have seen donkeys in their civilized state have no conception of the wild and original animal. Far from the passive and subdued appearance of the English ass, the animal in its native desert is the perfection of activity and courage; there is a high-bred tone in the deportment, a high-actioned step when it trots freely over the rocks and sand with the speed of a horse. When it gallops freely over the boundless desert, no animal is more difficult to approach; and although they are frequently captured by the Arabs, those taken are invariably the foals, which are run down by fast dromedaries, while the mothers escape."

The rarer Somaliland ass (*Equus somalicus*) is grayer, lacks the shoulder stripe, but shows numerous cross stripes on the legs.

**The Donkey.** The domestic ass is undoubtedly, in its origin, the tamed African species (*africanus*). Its prevailing color is gray, varying to pure white or full black, and with the shoulder stripes and leg bars more or less preserved. It was known in Egypt long before the horse and probably was first domesticated in that region, where it is still a favorite ani-

mal, not only for riding, but for its milk; nevertheless, it is said to have been hated and abused by the ancient Egyptians in their flourishing period, and the prejudice against it was carried among the Romans. From Judg. iv. 10 we learn that at a very early period the great were accustomed to ride upon white asses, and a preference is still given to white asses in the East. Fine large breeds exist at the present day in Syria and Turkey. In Europe choice breeds are to be found in Italy, Malta, and especially in Spain. The animal seems not to have come into general use in Great Britain until after the time of Elizabeth, and now is chiefly employed there by peddlers and the poor, or for children's carriages. Its price is scarcely one-twentieth that of a good horse, and it can be kept at one-fourth of the expense, delighting in the coarse herbage which other animals reject and satisfied with comparatively scanty fare. The obstinacy ascribed to the ass seems to be very generally the result of ill treatment; and proverbial as it has become for stupidity, it is probably quite equal in intelligence to the horse. It was early brought to America, and the finest donkeys in the world are now said to be those in the United States, where some 60,000 are owned upon farms, chiefly in the southern central States, and used for the propagation of mules and hinnies (see MULE), the useful hybrids between the ass and the horse. Consult V. Hehn, *Wanderings of Plants and Animals*, Eng. trans. by Stallybrass (London, 1891).

The milk of the ass contains more sugar of milk and less caseine than that of the cow, and is therefore recommended as a nutritious diet in cases of weak digestion. Its usefulness in cases of consumption has long been known, and it was often prescribed as a kind of specific when that disease was treated on principles very different from those which now regulate its treatment. In some parts of the Sudan large herds of she-asses are kept solely for milking.

The leather called shagreen is made by a peculiar process from the skin of the ass, which also affords excellent leather for shoes and the best material for drums. The bones of the ass, which are very solid, were used by the ancients for making flutes. Consult Osborn, *New York Zoölogical Society Bulletin*, No. 55 (New York, 1913). See Colored Plate of HORSES and Plate of EQUIDÆ.

**ASS, FEAST OF THE.** A religious carnival especially popular in northern France during the Middle Ages. It was of the nature of a parody on the service of the Church, but seems to have been instituted in good faith and without any intentional irreverence, to commemorate the biblical flight of Mary and her child into Egypt. It degenerated, however, into scurrilous indecency and was prohibited by the ecclesiastical authorities in the fifteenth century. It was variously celebrated in different places; thus, e.g., at Rouen it occurred shortly before Christmas and consisted in the representation of a little farce, in the principal scene of which Balaam's ass appeared before the altar of the cathedral (hence the name "Feast of the Ass") and uttered a prophecy of the early coming of Christ. See ABBOT OF JOY.

**ASSAB,** ăs-săb′, or SABA, sä′bä. A sheltered bay and town in Eritrea, on the African coast, near the south end of the Red Sea (Map: Africa, J 3). The bay is about 16 miles long by 5 miles wide, and about 50 feet deep at Busna, the main anchoring place. Together with two small islands in front of it, Assab was ceded to the Italian government, in 1881, by an Italian steamship company, which had acquired it in 1869. The town of Assab is at the entrance to the bay, has a population of 5000, and is the export centre of the products of the Danakil coast, hides, pearls, and mother of pearl.

**ASSAFŒTIDA.** See ASAFŒTIDA.

**ASSAI,** ăs-sī′ (from the native Brazilian name of the palm tree). A beverage much used at Pará and other places on the Amazon. It is prepared from the fruit of certain species of palm nearly allied to the cabbage palm of the West Indies. (See ARECA; CABBAGE PALM.) The assai palms are remarkably slender trees, the most common species (*Euterpe edulis*) rising to the height of 60 or 80 feet, with a smooth stem only about 4 inches in diameter. The fruit is small, but is produced in great quantity upon branched spadices, which are thrown out horizontally beneath the crown of leaves. It consists of a hard seed, with a very thin covering of a firm pulp or flesh. The tree grows in swamps flooded by the high tides. Warm water is poured upon the fruit; and by rubbing and kneading, a liquid is procured, consisting simply of the pulp of the fruit and water, which is constantly sold in the streets of Pará, and of which the inhabitants are extremely fond. This is assai. It is a thick, creamy liquid, of a purplish color, and a flavor like that of a freshly gathered nut. It is commonly used with the bread made from manioc, called farina, and either with or without sugar. The stem of the assai palm is sometimes used for poles and rafters, and its terminal bud as a cabbage or as a salad with oil and vinegar; but it is too much valued upon account of its fruit to be often cut down for these purposes. Another species, *Euterpe catinga*, is found in forests of a dry, sandy soil and very peculiar vegetation, known as catinga forests. The beverage made from it is sweeter than the common kind, but the product of the tree is much smaller.

**ASSAL,** ăs-säl′. An important salt lake in the east of Africa, near the head of the Bay of Tajura, French Somaliland. It is over 8 miles in length and 4 miles broad, and its surface is over 530 feet below the sea level. Its shores are covered with salt, which is exported in considerable quantities to Abyssinia.

**ASSAM.** A province of British India, lying northeast of Bengal and bordering on China and Burma. In October, 1905, it was amalgamated with 15 districts of northern and eastern Bengal to form the province of Eastern Bengal and Assam. Prior to this amalgamation the area of Assam was 61,682 square miles, including the native State of Manipur (8456 square miles); and the population, including Manipur, was 6,126,343, according to the census of 1901. The area of the new province, Eastern Bengal and Assam, was 111,569 square miles, of which 12,542 square miles were included in the native states of Manipur and Hill Tipperah; and the total population, adjusted to the 1901 census, was 30,961,459, of whom only 457,790 were in the two native states. On April 1, 1912, Eastern Bengal and Assam ceased to exist as a political division, and Assam again became a separate province, under a chief commissioner. The area of the new province of Assam is stated at 61,471 square miles, and the population (1911 census)

7,059,857; these figures include Manipur state, with 8456 square miles and 346,222 inhabitants. The population is almost wholly rural. The province of Assam falls into three natural divisions: the valley of the Surma, the valley of the Brahmaputra, or Assam proper, and the intervening range of hills. Among the mountain districts are the Garo Hills, the Khasi Hills, and the Jaintia Hills. The streams are abundant, and the lower lands often suffer inundations. The annual rainfall is copious, but sometimes unfavorably distributed; in some sections it is perhaps the heaviest on the globe; at Sylhet, in the Surma valley, the annual average is 157 inches, and 458 inches at Cherapunji, where, in 1861, 905 inches are said to have fallen, of which 503 inches were recorded in June and July. The atmosphere is consequently extremely humid, but at no period of the year is the heat excessive. The frequent occurrence of earthquakes is a great hindrance to the development of the region. A large portion of the country is covered with jungle, in which elephants, tigers, leopards, rhinoceroses, bears, wild dogs, wild hogs, and other wild beasts are found in abundance. Large deposits of coal, iron, and petroleum are known to exist, but only the first is exploited to any extent. The soil is mostly very fertile, and the extensive forests contain numerous useful woods. The tea plant is indigenous, and tea culture has grown rapidly. The area under tea is over 300,000 acres, and the plantations are owned largely by Europeans. In 1901 there were over 700,000 immigrants from other parts of India employed as coolies in tea gardens in Assam. The great staple of agriculture is rice. The principal articles of export are rice, tea, silk, cotton, rubber, ivory, and gold. The commerce is mostly in the hands of the Jains.

The Assamese, or Ahoms, are probably a Hindu-Shan (Mongolian) mixed stock, with the Hindu element predominant. They are short and thickset, with coarse black hair and Mongoloid face. The two main indigenous languages are Bengali, spoken by 48 per cent of the population in 1901, and a sister language, Assamese, spoken by 22 per cent; altogether 167 different languages and dialects were reported. The Assamese literature is extremely scanty. The country contains a number of primitive peoples, especially the Lushai, accounts of whose language, customs, folk tales, etc., were published in 1894 and 1912 by John Shakespeare, an English army officer. In religion nearly three-fifths of the people of Assam are Hindu, about one-fourth Mohammedan, and one-sixth animist.

Consult: Hunter, *Statistical Account of Assam* (London, 1880); Reid, *Chin-Lushai Land* (Calcutta, 1894); Brown, *Grammatical Notes on the Assamese Language* (Nowgong, 1893); Bronson, *Dictionary in Assamese and English* (Sibsagor, 1867); Grierson, *Specimens of the Bengali and Assamese Languages* (*Linguistic Survey of India*, vol. v, part i, Calcutta, 1903); Gait, *History of Assam* (Calcutta, 1906); article "Assam" in *Imperial Gazetteer of India* (Oxford, 1908).

**ASSAS'SINA'TION.** The act of taking the life of any one by surprise or treacherous violence, either by a hired emissary, as in the case of political plots, or by a fanatic who hopes to further his ideas through the death of his victim, as in the case of anarchists in recent times. Generally the term is applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times assassination was not unknown, and was often even applauded, as in the scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogiton. The following list includes the most important assassinations: Philip of Macedon, 336 B.C.; Julius Cæsar, 44 B.C.; Thomas à Becket, 1170; Albert I, Emperor of Germany, 1308; James I of Scotland, 1437; Alessandro de' Medici, 1537; Cardinal Beaton, 1546; David Rizzio, 1566; Darnley, 1567; James, Earl of Murray, Regent of Scotland, 1570; William of Orange, 1584; Henry III of France, by Jacques Clément, 1589; Henry IV of France, by Ravaillac, 1610; Villiers, Duke of Buckingham, by Felton, 1628; Wallenstein, 1634; Archbishop Sharp, 1679; Gustavus III of Sweden, 1792; Marat, by Charlotte Corday, 1793; General Kléber, at Cairo, 1800; Paul, Czar of Russia, 1801; Perceval, English premier, by Bellingham, 1812; Kotzebue, the dramatist, 1819; Duc de Berry, 1820; Charles III, Duke of Parma, 1854; Abraham Lincoln, by Booth, 1865; Michael, Prince of Servia, 1868; Marshal Prim, 1870; Georges Darboy, Archbishop of Paris, by communists, 1871; Earl of Mayo, Governor-General of India, 1872; Abdul Aziz, 1876; Alexander II, Czar of Russia, 1881: President J. A. Garfield, at Washington, by Guiteau, 1881; Lord Frederick Cavendish and T. H. Burke, at Phœnix Park, Dublin, 1882; President Carnot of France, at Lyons, 1894; Stefan Stambuloff in Sofia, Bulgaria, 1895; Empress Elizabeth, of Austria, at Geneva, by an anarchist, 1898; King Humbert I, of Italy, at Monza, by an anarchist, Bresci, 1900; President William McKinley, at Buffalo, N. Y., 1901; M. von Plehve in St. Petersburg, 1904; Grand Duke Sergius in Moscow, 1905; M. Petkoff, Premier of Bulgaria, 1907; General von der Launitz, St. Petersburg, 1907; General Pavloff, St. Petersburg, 1907; Carlos I of Portugal, in Lisbon, 1908; Prince Ito, at Harbin, Manchuria, 1909; Premier Stolypin in Kieff, 1911; Premier Canalejas of Spain, in Madrid, 1912; King George I of Greece, in Salonica, 1913; Mahmud Shefket Pasha, Grand Vizier of Turkey, in Constantinople, 1913. Consult Johnson, *Famous Assassinations* (Chicago, 1903). See ASSASSINS.

**ASSASSIN-BUG.** A bug of the bloodsucking family Reduviidæ. See CONE-NOSE; INSECT, *Poisonous Insects.*

**ASSAS'SINS** (Fr. *assassin*, OF. pl. *hassasis*, from Ar. *hashashin*, pl. of *hashash*, hashish-eater). A secret order of Islam, partly religious and partly secular in character, and an offshoot of the sect of Ismaili, which was in turn a branch of the great Shiite faction. The members of the Order of Ismaili derived their name from Ismail, a descendant of Ali, in whose line they considered the religious headship of the Mohammedan world to be rightfully vested. They united to this tenet the belief in the moral indifference of all actions and in the worthlessness of popular religion. Toward the middle of the eleventh century Hassan ben Sabbah, a Persian of gifted mind and energetic character, came to Cairo and attained a high rank among the Initiated of the Ishmaelite Order. Political reasons forced him to flee to Persia. In 1090 he acquired the fortress of Alamut, in the district of Rudba, and made it the home of a new organization, whose principles were in the main those of the Ismailites, with the addition of a

new feature, namely, the practice of the secret assassination of all enemies of the order. At the head of the new organization stood an absolute ruler, the Sheik-al-Jebal, or, as he became known in mediæval folk-lore, "The Old Man of the Mountain." Below him were three deputy-masters, in the provinces of Jebal, Kohistan, and Syria. Next in rank were the Dais, or Initiated, and the Refiks, or Students, who were only partially acquainted with the secrets of the order, but were graduated in time into the rank of Dais. Below these came the active members of the order, the Fedavis, or Fedais, meaning 'The Devoted Ones,' young men who were kept in absolute ignorance of the teachings of the order, but from whom complete obedience was expected. These were the blind instruments in the work of assassination planned by the leaders. Before they were assigned to their tasks these youths were stupefied by means of *hashish*, or the hemp plant, and while in an ecstatic condition they were plunged into all the pleasures of the senses as a foretaste of the bliss which awaited them in Paradise if they should faithfully execute the commands of their superiors. But the word *hashashin*, or hemp-eaters, was changed by the Europeans into *assassins*, and acquired the common meaning of murderers, which it bears at present. The novices, mechanics, and laborers formed the sixth and seventh classes of the order, and upon them the observance of Islam was strictly enjoined, though the Initiated were exempted from its precepts. For 150 years the Order of Assassins held Asia Minor and Persia in terror. More than one caliph fell a victim to their knives. Princes paid tribute to the "Old Man of the Mountain," and the services of his followers were even hired by contending political factions. In all, there were six Grand Masters of the order besides Hassan, who died in 1124. Of these, Hassan II, in 1163, extended the secret privilege of the Initiated (that is, exemption from the precepts of religion) to the people generally, and abolished Islam in his dominions; but he was speedily assassinated, and under his grandson, Hassan III, the old institutions were restored. Under Mohammed II, the Deputy Grand Master of Syria made himself independent, and during the wars of the Crusades, wielded a terrible power. The murder of Conrad of Montferrat and other distinguished victims of assassination was attributed to him. The Mongol rulers of Persia broke up the order in 1255. The Syrian branch was put down by the Mameluke Sultan Bibars; but remnants of the sect lingered in Kohistan, and are said still to exist in different parts of India, Persia, and Syria.

Consult: Hammer-Purgstall, *Geschichte der Assassinen* (Stuttgart and Tübingen, 1818); F. Walpole, *The Ansayrii, or Assassins* (London, 1851); Heckethorn's *Secret Societies of All Ages and Countries* (New York, 1897), which contains much curious information, but is ill-digested and unreliable; Bliss, *The Religions of Modern Syria and Palestine* (New York, 1912); Guyard, *Fragments rélatifs à doctrine des Ismaélis* (Paris, 1847–77).

**ASSAULT'** (Lat. *ad*, to, at + *saltare*, to jump, leap). A military term signifying 'to attack.' Until very recent times troops would be told off to assault a fortified post, or position, being divided into three divisions: "storming parties," "supports," and "firing parties." It has always been a costly undertaking, now more so than ever, owing to the modern guns and magazine rifles with which all armies are equipped. In the assault on the fortified lines of the Confederate army at Cold Harbor (1864), in the Civil War, General Grant lost some 8000 men in about 15 minutes. The great losses suffered by the British in the Boer War of 1899–1902 were inflicted during the attack on the Boer *kopjes;* and the losses of the Japanese in their repeated assaults on Port Arthur were unparalleled. See ATTACK.

**ASSAULT AND BATTERY** (Fr. *batterie*, from *battre*, to beat, batter). An infringement of the common-law right to personal safety and freedom. The words "assault" and "battery" are commonly used together, for the reason that the two offenses which they indicate are usually committed together. But the offenses are separate and distinct.

An assault is an attempt or offer to inflict bodily injury upon another, accompanied by such circumstances as denote, at the time, an intention, coupled with the present ability, to do violence to the person. Battery is the actual infliction of threatened violence, the consummation of an assault. Mere words of abuse will not constitute an assault; nor will a threat or offer to do violence, when it clearly appears that he who makes the threat or offer has no intention or no present ability to carry it into execution. But an *actual* intent or an *actual* present ability to injure the person is not necessary. It is sufficient that these are apparent and that the circumstances are such as to cause the person threatened to believe, on reasonable grounds, that such apparent intent and ability are real. Thus the pointing of an unloaded gun at a person who is ignorant of the fact that it is not loaded, the circumstances indicating an intention to shoot, will amount to an assault. The least touching of another's person in anger or willfully or negligently, whether with the hand or with a stone or other weapon, is a battery.

To use, or to attempt or offer to use, violence upon the body of another is in some cases justifiable. Thus a father or a schoolmaster may chastise a child, within proper bounds and in the process of rightful discipline. So a person is justified in using all necessary means, even though obliged to resort to force, to protect and defend his person, the person of his servant, or of one of his family, or his real or personal property. The force employed in defense, however, must be no greater than the emergency requires; for any excess of violence the person using it will be responsible, as for an assault and battery.

Assault and battery are both civil and criminal offenses. As civil wrongs they are classified under the head of torts, and subject the wrongdoer to an action for damages; and as crimes, under that of misdemeanors. Certain criminal assaults are known as aggravated assaults and are followed by a more severe punishment. Such are assaults with intent to kill or with intent to commit rape, and assaults upon magistrates in courts of justice, with knowledge of the official character of the persons assaulted. See the authorities referred to under CRIMINAL LAW; TORTS.

**ASSAYE**, ăs-sī'. A village 261 miles northwest of Hyderabad, south India, lat. 20° 18′ N., and long. 75° 55′ E., 43 miles northeast of

Aurangabad (Map: India, C 4). It claims notice chiefly as the scene of the first great victory of the Duke of Wellington, then Major-General Wellesley, won on Sept. 23, 1803. The British troops in action were about 9500, while the Mahrattas, under Scindia and the Rajah of Berar, numbered 50,000, of whom 10,000 were commanded by French officers. Ninety-eight pieces of cannon, seven standards, all the baggage, and a large part of the ammunition of the Mahrattas fell into the hands of the conquerors, whose casualties numbered 1560 in killed and wounded. The loss of their opponents was 12,000.

**ASSAYING** (OF. *assai*, Lat. *exagium*, a weighing, weight; *exigere*, to drive out, examine, from *ex*, out + *agere*, to drive, lead, guide; cf. *examen*, for *exagmen*, and *exact*). In its widest meaning, the term includes all those operations of analytical chemistry which have for their object the determination of the value of ores and their metallurgical products. In its more limited meaning, assaying is the process employed in determining the proportion of gold and silver in ores, coins, silver and gold plate, jewelry and other commercial alloys of the precious metals. In Great Britain each article of gold or silver is assayed at the Goldsmith's Hall previously to being sold, to determine its standard of purity, and at the various mints of the United States and foreign governments the bullion received for coinage is assayed for a similar purpose. Two general methods are employed for assaying metals and metal-bearing ores, which are commonly known as the wet method and the dry method. To the dry method belongs fire-assaying, and to the wet method belongs gravimetric and volumetric analysis, including colorimetric determinations. Any attempt to define or explain these methods of analysis without technicalities, understood only by the chemist, is always somewhat disappointing, but the following definitions will give a general notion of what is meant in each case.

**Fire-assay Determinations** involve the separation of the metal sought from the other constituents of the ore or alloy by the aid of heat and suitable fluxes to form a slag with the foreign matter, and its estimation by weighing in a state of purity. To illustrate, if the object is the determination of lead in an ore, the ore is mixed in a crucible with suitable fluxes and fused; the lead is returned to the metallic state, in which condition it is readily detached from the slag for weighing, the various non-metallic elements present in the original ore combining with the materials in the flux and forming new substances.

**Gravimetric Determinations** involve the separation of the substance sought from the other constituents of the ore, and its estimation by weighing the substance either in a state of purity or as a constituent of a chemical compound whose composition is accurately known. To illustrate, if the object is the determination of lime in a mineral, the latter may be treated in such a manner that the ultimate product of the treatment is pure lime, which can be weighed direct; or the treatment may be such that the product is calcium sulphate, whose weight may be determined, and as this salt is of invariable composition the contained lime can be readily calculated.

**Volumetric Determinations** are those which involve the separation of the substance to be determined from all interfering constituents of the ore, and the final measuring of the quantity of a solution necessary to complete a certain chemical reaction; or, as in the case of colorimetric determinations, by measuring the color imparted to a definite quantity of the liquid by the constituent sought, in comparison with the color imparted to the same quantity of water, or other suitable fluid, by a known quantity of the constituent sought. Fire-assaying was formerly applied to gold, silver, copper, tin, and lead ores, but in recent years has been applied only to gold-silver ores and alloys of gold and silver, determining one or both metals from the same sample; in gravimetric analysis, frequently several or all of the constituents are determined from one sample; and in volumetric analysis a separate sample is often taken for each determination. To save time or when large numbers of samples are to be analyzed for the same ingredients it is customary to make more than one determination on each sample tested.

**Sampling.** The first operation in making an assay is to obtain a sample which represents in every respect the original material. In ore sampling the same percentage of coarse and fine ore as contained in the original lot should enter the sample, as the percentage of metal contained in the fine is generally higher than that contained in the coarse. Great care should be exercised, and one who is not thoroughly familiar with ores, metals, and the theory of sampling should not attempt to obtain an average sample for assay. Sampling may be subdivided under the two heads of ore sampling, and sampling of metallurgical products. Ore sampling may be done either by hand or machinery. The common method of hand sampling is known as coning and quartering. The method is as follows: As the ore is unloaded from the cars every third, fifth, or tenth shovelful, depending on the size, quantity, and value of the ore, is taken indiscriminately and thrown into a wheelbarrow as a sample. This sample is crushed to the proper size and shoveled into a conical pile. The coarse ore rolls down the sides and the fines, which are usually high grade, remain on the apex of the cone. If the location of the apex is changed a few inches from the centre during this process, the resultant sample will not be an average. The cone is then flattened into a circular cake working the pile down from the periphery and gradually advancing toward the centre containing the fine rich ore. In this operation the sample can be vitiated by unequal distribution of the fines. The cake thus formed is then divided diametrically into quarters, separated, two diagonal quarters rejected, and the two remaining diagonal quarters selected for a sample. These operations of coning and quartering are repeated several times, the ore being crushed between the several operations when necessary to obtain the proper size of ore, relative to the weight of the sample, until the resultant sample weighs from 10 to 50 pounds. The size of this ore should be under ¼ inch, depending on its character. From this point the weight of the sample is reduced by riffling, crushing to finer sizes when necessary between the operations. When the weight of the sample is reduced to about one pound, it is customary to pulverize it until it will fall through a screen of from 60 to 100 meshes to the inch, thoroughly mix, and separate into four samples. This powdered sample of ore is called

*pulp*. The samples, weighing about four ounces each, are placed in paper sample bags and sealed. If the work is being performed for a public smelter one sample goes to the buyer, one to the seller, and two are marked for umpiring in case of a dispute on the results. This method cannot be recommended, as it is exceedingly difficult to obtain by hand an average sample from the original ore shipped.

In most large smelting plants the sampling and preparing of the pulp are now done entirely by machinery.

Metallurgical products are sampled either by drilling, or dipping from the molten metal. Dip samples of bullion are more accurate than drillings, on account of the segregation of values which takes place in cooling when bullion is cast into bars.

When a sample is submitted to an assayer for analysis a preliminary examination with a magnifying glass, blowpipe, and sometimes qualitative tests, are made to determine its character and general composition. The formal analysis is then undertaken. The laboratory apparatus necessary for general assaying is quite extensive, consisting of a large variety of chemicals, balances, crucibles, cupels, furnaces, beakers, etc. A different mode of procedure is adopted in assaying different metals, and for illustration the method of assaying gold and silver by the fire-assay, and of silver by gravimetric analysis, will be described, the reader being referred to special treatises on assaying, metallurgy, and chemistry for details of the processes employed for other metals.

**Assaying Gold and Silver Ores.** Gold and silver generally occur together in ores, and such ores are universally determined by fire-assay, either by means of scorification or by the crucible method. If the ore contains volatile materials such as antimony, arsenic, etc., it should be assayed by scorification. If the ore is free from volatile materials it is usually assayed by the crucible method, which permits a much larger amount of ore being taken, thereby reducing errors in weighing the resultant button of gold or silver. The American practice is to use assay-ton weights where 1 milligram of gold or silver obtained from 1 assay-ton of ore represents 1 ounce of gold or silver per ton of 2000 pounds. This system of weights was devised by Prof. Charles F. Chandler to reduce assay computations. The fire-assay consists essentially in the collection of the gold and silver in a button of metallic lead. Large buttons tend to cause loss in cupelling and small buttons are liable not to collect all of the gold and silver in the sample. The lead button is freed from adhering slag, hammered into the form of a cube for convenience in handling, and cupelled; resulting in a button of gold and silver.

In the scorification assay the charge consists of a mixture of from 20 to 50 grams of granulated lead, from .1 to .4 assay-ton of ore dependent on the character, and about 1 gram or less of borax glass. This charge is placed in a scorifier, a shallow, unglazed, earthenware saucer, and covered with from 20 to 50 grams of granulated lead. The scorifier containing the charge of ore covered with lead is then placed in a muffle furnace, melted, oxidized by permitting a current of air to pass through the furnace, and fused until the slag, formed by the combination of the oxide of lead and silica of the ore, forms a covering over the molten lead which now contains the gold and silver that was in the original ore. This is poured into an iron mold, cooled, and the lead separated from the slag for cupelling.

In the crucible assay various charges are used, depending on the character of the ore. Sulphide ores require less litharge and may require the addition of iron and nitre to the charge. Ores containing copper require large amounts of litharge to hold the copper in suspension or solution in the slag. The common fluxes used in the crucible assay are: litharge, bicarbonate of soda, potassium-carbonate, borax glass, iron in the form of nails, nitre, flour, and silica. The crucible charge consists of a mixture of from ½ assay-ton to 2 assay-tons of ore and from 2 to 3 times as much flux. This mixture is placed in a fireclay crucible, covered with salt or borax, placed either in a muffle or pot furnace, heated slowly for half an hour to drive off the gases produced from the chemical reactions, and then heated at a high temperature for half an hour to form a complete fusion. The litharge, reduced to metallic lead, collects the gold and silver, and settles to the bottom of the crucible. The contents can be poured into an iron mold while hot or the crucible withdrawn from the furnace and allowed to cool. The lead containing the gold and silver is separated from the slag preparatory to cupellation.

**Cupellation** is conducted as follows: the cupel, a small basin-shaped vessel made of bone-ash, is placed in a muffle furnace thoroughly heated; the lead button is placed in the cupel, melted, and oxidized by the air passing through the furnace; the oxide of lead produced is either volatilized or absorbed by the cupel. Just before the last traces of lead are removed the melted button exhibits a play of color, darkens, and finally brightens, which is the completion of the operation. The cupel is taken from the furnace, cooled, the button removed, cleaned of adhering dirt, and weighed for gold and silver.

The gold is separated from the silver by *parting*, which consists of dissolving out the silver in a hot dilute nitric acid. To accomplish this it is necessary for the gold-silver button to contain at least 2½ times as much silver as gold. If the ratio is less, the gold-silver button is wrapped in lead foil with a piece of pure silver and re-cupelled. The resultant gold, after the silver has been dissolved, is black and must be washed, dried, and annealed by heating to redness. After cooling, the gold button is weighed and the amount deducted from the weight of the gold-silver button.

**Assaying Silver Bullion.** Silver bullion may be assayed by cupellation with lead, as explained above, the process being exactly as described for gold and silver ore, except for the preliminary scorification or fusing. The method of assay for silver bullion adopted by the United States mints and assay offices, and in the mints of most foreign countries, is volumetric analysis. Briefly described, this consists in dissolving the silver compound in nitric acid and then adding sodium chloride (common salt) solution, which insures the precipitation of the chloride of silver. The salt solution is made of definite strength, and is poured out of a graduated vessel until further precipitation of the silver ceases, when the amount of salt solution used is read off the graduated vessel, and by a simple calculation its equivalent in pure silver is determined.

**Assaying Gold Bullion.** The assay of gold bullion requires the removal first of the base metals, and second of the contained silver. The base metal is removed by cupellation with lead, as described above, leaving a button of gold and silver. The silver is then removed from the gold by solution in nitric acid, the gold remaining behind in an insoluble state, when it is annealed and weighed. The mode of assaying gold described cannot always be followed out in the examination of jewelry and other manufactured articles, as, though only a few grains are required for the assay, yet the removal of such might entail the destruction of the article, and in such circumstances the *touch-stone* is resorted to. This stone was originally brought from Lydia, in Asia Minor, and consisted of a cross-grained quartz saturated with bituminous matter, but black basalt and other stones are now employed for the same purpose. The manner of using the stone is to draw a streak upon it with the auriferous article and on each side to draw similar streaks with gold points of known value; from the color of the streaks the richness of the gold can be very accurately determined by the practiced assayer. The subsequent action of nitric acid on the golden streaks serves also as a means of determining the purity of the metal, as the acid readily dissolves the copper and silver and leaves the gold. The assay of gold-silver ores is always reported in Troy ounces per ton of 2000 pounds. The value of gold is $20.67 per Troy ounce. The assay of gold-silver bullion is always reported in fineness or the number of parts of metal in 1000 parts of bullion. Jewelers report the fineness in karats or the number of parts in 24. Gold marked 18 kt. should contain 75 per cent of gold and should be 750 fine. Consult: Low, *Technical Methods of Ore Analysis* (New York, 1905, 5th ed., 1911); Ricketts and Miller, *Fire-Assaying* (New York); Prest, *Manual of Chemical Analysis* (New York, 1905); Lodge, *Fire-Assaying* (New York, 1904; 3d ed., 1911); Aaron, *Assaying* (2 vols., San Francisco, 1906); Fulton, *Manual of Fire-Assaying* (2d ed., New York, 1911).

**ASSAY' OF'FICE.** A government bureau where gold and silver bullion is purchased, sold, assayed, and refined, but no coin produced. (See ASSAYING.) The assay offices of the United States are included in the Mint Service of the Treasury Department, and are located at New York; Charlotte, N. C.; Deadwood, S. D.; Helena, Mont.; Boise, Idaho; Salt Lake City, Utah; Carson, Nev.; New Orleans, La.; Seattle, Wash.; and at the coinage mints of Philadelphia, San Francisco, and Denver. From the gold and silver deposited at the mints and assay offices bars are manufactured which are graded as follows: Fine bars, mint bars, standard bars, and unparted bars. The value of all gold bullion, contained in original deposits at the mints and assay offices of the United States for 1912, amounted to $151,929,881. During 1911 the San Francisco Mint received the largest amount by weight, about 80 per cent coming from California and Alaska. Deadwood, Seattle, and Denver received large amounts in the order named. About 70 per cent of the gold received at Seattle during 1911 came from Alaska. Of the more important gold-producing countries, Alaska sends most of its production to Seattle and San Francisco; South Dakota to Deadwood; Nevada to Denver, San Francisco, Carson, and Salt Lake; California to San Francisco; and Colorado to Denver. The refining of bullion is carried on at the mints and the New York Assay Office. During 1912 the New York Assay Office received and refined more bullion than any one mint. For the enforcing of the stamping act governing the manufacture and sale of jewelry, marked with karat fineness, a large number of articles were assayed. The office was also called upon to make a large number of gold assays for the United States District Attorney. This office was established in 1854 in a building erected on Wall Street in 1823 for the Second National Bank of the United States, transferred to the Bank of the State of New York in 1836, and to the United States government in 1854. The building was vacated January, 1912, and the department moved to the refinery building in the rear pending the erection of a new and larger structure on the site of the old building.

Consult the *Annual Report* of the Director of the Mint. See MINT.

**ASSE,** ăs. A fennec. See CAAMA.

**ASSEGAI,** ă'sĕ-gī (Sp. *azagaya*, Ar. *az-zaghāyah*, from *al*, the + Berber *zaghāyah*, spear). A short spear used by natives of south Africa, especially the warlike Zulus and other Kaffir tribes, with a very thin shaft of hard wood of about 5 feet in length, and an iron blade secured by a strip of rawhide. When used for throwing, the blade is convex on one side and concave on the other, so as to transmit a rotary motion to it. A shorter form of the weapon with a very broad blade is used at close quarters for stabbing.

**ASSEMANI,** ăs'sĕ-mä'nĕ (Ar. AL-SAMANI), GIUSEPPE ALOYSIO (1710–82). Brother of Giuseppe Simone Assemani, and professor of Oriental languages in Rome. He published *Codex Liturgicus ecclesiæ universæ* (1749–60); *Commentaria de catholicis seu patriarchis Chaldæorum et Nestorianorum* (1775).

**ASSEMANI,** GIUSEPPE SIMONE (1687–1768). A Syrian Orientalist. He was born at Tripoli, Syria, and was educated at the Maronite College in Rome. During two journeys in the East, in 1717 and 1735, he collected a large number of Oriental manuscripts in Egypt and Syria for the library of the Vatican, of which he was the custodian. As a reward for his services, he was made titular Archbishop of Tyre. His principal works are: *Bibliotheca Orientalis Clementino-Vaticana* (4 vols., 1719–28); German abridgment, A. F. Pfeiffer, containing Syrian manuscripts in the library of the Vatican; *Opera Ephraëmi Syri* (6 vols., 1732–46); *Italicæ historicæ Scriptores* (4 vols., 1751–53); *Kalendaria Ecclesiæ Universæ* (6 vols., 1755–57); *Bibliotheca Juris Orientalis Canonici et Civilis* (5 vols., 1762–66).

**ASSEMANI,** SIMONE (1752–1821). An Oriental scholar, grandnephew of Giuseppe Simone Assemani. He was born at Tripoli, Syria, was educated at Rome, worked for some time as a missionary in Syria, and in 1785 was appointed professor of Oriental languages at Padua. His principal works are: *Museo cufico Naniano illustrato* (2 vols., Padua, 1787), an important contribution to numismatics; and *Saggio sull' origine, culto, letteratura, e costumi degli Arabi avanti Maometto* (Padua, 1787). He was one of the scholars who detected the fraudulent character of the *Codice diplomatico di Sicilia sotto il governo degli Arabi*, published in 1789–92 by Alfonso Airoldi, and claiming to be a

correspondence between the Arabic governors of Sicily and their sovereigns in Africa, translated by Giuseppe Vella, after the first volume of the pretended Arabic text had been published by Vella under the title *Kitab divan Misr* in 1793. See VELLA, GIUSEPPE.

**ASSEMANI,** STEFANO EVODIO (1707–82). A Syrian Orientalist. He followed the studies of his uncle, Giuseppe Simone Assemani, whom he succeeded as custodian of the Vatican Library. He was titular Archbishop of Apamæa and held several lucrative positions in Italy. His works include *Bibliothecæ Mediceo-Laurentianæ et Palatinæ Codd. Manuscr. Orientalium Catalogus* (2 vols., Florence, 1742) and *Acta ss. Martyrum Orientalium et Occidentalium* (2 vols., Rome, 1748), and a part of *Bibliothecæ Apostolicæ Vaticanæ Codd. Manuscr. Catologus* (3 vols., Rome, 1756–69), which he wrote in conjunction with his uncle.

**ASSEM'BLY** (Fr. *assemblée*, ultimately from Lat. *ad*, to + *simul*, together). Any drum-beat or bugle-call designated to bring troops into ranks or to appointed stations. See BUGLE AND TRUMPET CALLS; DRUM.

**ASSEMBLY,** GENERAL. See PRESBYTERIANISM; also LEGISLATURE.

**ASSEMBLY,** NATIONAL (France). The States-General (q.v.), convoked by Louis XVI of France, and opened May 5, 1789, consisted of the two privileged orders, the clergy and the nobles, and of the *tiers-état*, or commons. The Third Estate, composed of representatives from the towns and rural communities, outnumbered the other orders, and demanded that the voting should be by heads, in united assembly, and not by orders sitting separately. Upon the refusal of the privileged orders to concede this demand the Third Estate, on June 17, assumed the title of *Assemblée Nationale*, and the right to act in the name of France. The court attempted to annul this resolution in a royal sitting, June 23, but the deputies of the Third Estate, together with the liberal members of the other two orders, had bound themselves three days before by the so-called Oath of the Tennis Court not to separate until they had given France a constitution, and declared every attempt at violence on the part of the court treason. The King yielded, commanding the nobles and clergy to join the National Assembly. The Revolution had begun. The Assembly proceeded with astounding rapidity to metamorphose old France. Feudal rights and hereditary privileges were abolished on August 4, and the Declaration of the Rights of Man followed. In February, 1790, succession by primogeniture was abolished; in March *lettres de cachet* and the oppressive salt tax were abolished; in June all orders and titles of nobility were annulled. In July the civil constitution of the clergy was decreed; at the same time non-Catholics were reinvested with the property forfeited by their ancestors on account of their faith; Jews were relieved from personal taxation, and the game laws done away with. In September the Parliaments were suppressed. A decree of October 18 abolished the cruel criminal penalties of Louis XIV. In January, 1791, all corporations and guilds were abolished and free trade introduced. In February political rights were conceded to Quakers and in September to all citizens, of whatever color or religion.

The principles on which the Assembly proceeded were the sovereignty of the People, the limitation of the royal power through a conditional veto, the separation of the legislative and the executive powers, and the responsibility of ministers. Accordingly the Assembly, shortly after it was constituted, declared that to it alone, subject to the royal veto, belonged the legislative power. Several decrees in September, 1789, determined that the legislative body should form only one chamber, and should be renewed every two years; other decrees declared that the King was inviolable and the throne inalienable. A decree of November 7 forbade the deputies to undertake the place of ministers; and in December the new organization of the communes was begun. In January, 1790, France was divided into departments; in April trial by jury was introduced; in May it was declared that the right of war and peace belonged to the nation alone, i.e., to the Assembly.

The ecclesiastical and financial policies of the Assembly were closely connected. The bankruptcy of the State led to the confiscation in toto of the real estate of the Church; but the State, on the other hand, agreed to pay the Church debt and to provide also the salaries of both bishops and parish priests, lowering the former and raising the latter. The ecclesiastical policy, indeed, would have met with little opposition had it not been for the proposed method of electing priests and the oath of allegiance required from them. (See FRENCH REVOLUTION.) The financial policy of the Assembly was less felicitous. Certain reforms were, it is true, decreed; but they availed nothing in face of the slough of paper money into which the Assembly speedily sank. The first issue of assignats, based on Church lands, in the beginning circulated at par; but a second, floated on the guarantee that there would be no further issue; and a third, which broke the guarantee, soon brought about a state of chaos.

When the new constitution had been accepted by the King, and sworn to by the Assembly, that body closed its sittings, Sept. 30, 1791. From its having framed the constitution (which lasted only 12 months), this assembly is usually called the Constituent Assembly. It made way for the *Legislative Assembly*, which was to reform the civil and criminal laws in accordance with the spirit of the new constitution. A decree provided that no member of the Constituent should be returned to the Legislative Assembly; and, as a result, the only men whose experience made them fit to carry on the work of the Revolution were excluded, and the Legislative Assembly was captured by untried and hot-headed radicals. The Assembly, from the very first, began an attack upon the remnants of the royal authority, which culminated in the rising of Aug. 10, 1792, the suspension of the royal power, and the establishment of the Republic by the National Convention in September, 1792. The constitution had provided for an appeal to the nation in extreme cases, and the Legislative Assembly exercised that right by convoking a *National Convention*, which was invested with the powers of the sovereign, was to decide the fate of the monarchy, and remodel the whole political system.

The title of National Assembly has been assumed by various other parliamentary bodies, originating in popular commotions and aiming at radical political changes; as the French Assembly that met after the Revolution of February, 1848, followed, May, 1849, by a legislative assembly; the German National Assembly at

Frankfort, known as the Frankfort Parliament (1848); the Prussian National (Constituent) Assembly; and the legislative body in France, which was instituted in 1871 after the fall of the Empire. Under the existing French Republic, the Senate and the Chamber of Deputies unite to form the National Assembly for amending the constitution and electing the President of the Republic.

For further information, consult: H. Morse-Stephens, *History of the French Revolution* (London and New York, 1886–91); Buchez and Roux, *Histoire parlementaire de la révolution française* (Paris, 1834–38); Montigny, *Mémoires de Mirabeau* (8 vols., Paris, 1834–43); Oulard, *The French Revolution* (3d ed., trans. from the French, London, 1910). See FRANCE.

**ASSEMBLY, RIGHT OF.** The right of the people peaceably to assemble for any purpose not expressly prohibited by law is an essential principle of popular government as understood under the British and American constitutions. While there seems to be no explicit declaration of the right in any English statute, it is deemed to be implied in the right of petition affirmed in the Bill of Rights enacted by Parliament on the accession of William III (1689). In the Federal Constitution of the United States, as well as in the constitutions of the several States, it is expressly declared, usually in connection with the right of petition. In the Federal Constitution it forms a part of the first amendment, which provides that "Congress shall make no law . . . abridging . . . the right of the people peaceably to assemble and to petition the government for a redress of grievances."

It will be observed that these constitutional provisions are aimed only at congressional or legislative interference with the right of assembly and do not explicitly protect it against arbitrary interference on the part of administrative or judicial officers, and it is in the unauthorized use of the powers conferred on such officials that the danger to the due exercise of the right lies. Such interference is, of course, illegal, as is any arbitrary and unauthorized exercise of power by the authorities of the state or nation, the remedy afforded being an action at law for damages or a criminal proceeding under federal or state statutes. While these provisions are theoretically adequate to protect the rights, they have not in practice always proved sufficient to secure it against occasional infringement.

*Unlawful assembly* is a criminal offense at common law. It is defined as "an assembly of three or more persons, either with intent to commit a crime by open force, or intent to carry out a common purpose, lawful or unlawful, in such a manner as to give reasonable grounds to apprehend a breach of the peace in consequence of it." It is distinguished from the offense of *riot* (q.v.) by the fact that the latter involves an actual attempt to carry the unlawful purpose of the assembly into effect.

**ASSEMBLY OF DIVINES.** See WESTMINSTER ASSEMBLY.

**ASSEN,** ä'sen. The capital of the province of Drenthe, in the Netherlands, 15½ miles by rail south of Groningen (Map: Netherlands, E 2). By a canal (Hoofdvart) it is connected with Meppel and the Zuider Zee. Assen contains an interesting set of buildings which, before the Reformation, were a nunnery, and which now contain the town hall, provincial offices, and a museum. Near the town are the "Giants' Caves," mentioned by Tacitus, with huge glacial-boulders resembling the rocks at Stonehenge. Pop., 1900, 11,191; 1910, 13,000.

**ASSENT',** ROYAL (Lat. *assentari*, to agree with, assent, from *ad*, to + *sentire*, to feel). The official act by which the sanction of the crown is given to bills which have passed both houses of Parliament. Under the modern parliamentary system this assent is given as a matter of course, the veto of the crown on legislation being practically obsolete. But in theory, the royal assent is still necessary, all acts of Parliament being "by the King's majesty, by and with the advice and consent of the lords spiritual and temporal, and commons in Parliament assembled." By the recent Parliament Act (1911) the assent of the Lords which has been twice refused to a bill passed by the Commons becomes unnecessary if the bill is passed a third time by the Commons without substantial change, provided that at least two years have elapsed since the introduction of the bill. (See PARLIAMENT; LORDS, HOUSE OF.) The principle of the royal assent to legislation has been adopted in all countries which have adopted a parliamentary form of government as well as in the government of the United States and of the several States. Nowhere else has it been reduced to the shadow that it has become in Great Britain, the veto power of the crown, of the president, or the governor being freely and effectively exercised. (See VETO.) Consult Blackstone, *Commentaries on the Laws of England*, and Amos, *A Primer of the English Constitution and Government* (London, 1886).

**ASSER,** ä'sĕr, TOBIAS MICHAEL CAREL (1838–1913). A Dutch statesman, born in Amsterdam. He was appointed in 1862 professor of law in the Athenæum of Amsterdam, and from 1876 to 1893 held a similar chair in the university. In 1875 he became counselor to the Foreign Office and in 1893 member of the Dutch Council of State. He was delegated to represent Holland in the Peace Conference at The Hague in 1899 and in the International Court of Arbitration in 1900. He received the Nobel peace prize in 1911. A profound student of international law, he published *Schets van het Nederlandsche Handelsregt*, 'Outlines of Dutch Commercial Law' (1899); *Schets van het International Privatsregt*, 'Outlines of Private International Law' (1879); *La codification du droit international privé* (1901); *Arbitrage international entre les Etats-Unis d'Amérique et la Russe* (1902).

**ASSESS'OR** (Lat. *assessor*, one who sits beside, from *ad*, to + *sedere*, to sit). In Roman law, a person called in by those administering public justice to sit with them and give legal advice and assistance. The practice has continued in those European countries in which the Civil Law system prevails, and such assessors constitute a regular part of the judicial machinery. In Great Britain statutory provision is made for the employment of assessors in various courts. The House of Lords may call in the aid of one or more assessors in admiralty appeals; the Privy Council, in ecclesiastical cases; the Court of Appeal, in any cause or matter; and the county courts, on the application of either party. The admiralty division may call in nautical assessors, and in ecclesiastical courts the bishop or his representative (known as the "Ordinary") sits with assessors.

It is the practice in some of the United States district courts, sitting in admiralty, for the judge, even without statutory authority, to call in the assistance, in difficult negligence cases, of two experienced shipmasters, who sit with the judge during the trial and give their advice upon questions of seamanship or the weight of testimony. Except in admiralty causes, the employment of assessors by courts does not obtain in this country. Our foreign consuls exercising a judicial authority under treaty in certain Oriental countries, are authorized in criminal cases to summon associates, who act in the capacity of assessors. (U. S. Rev. Stat., sec. 4106.)

In this country, however, the term is applied generally to officers who assess or value property for taxation. Their functions are partly ministerial and partly quasi-judicial. Where acting in a quasi-judicial capacity, they are not liable to a civil action for errors of judgment; nor in some States, e.g., New York, for willful misconduct. The only redress for the taxpayer injured by such misconduct is by a proceeding to review and correct the assessment or by a criminal prosecution. Consult the works referred to under CIVIL LAW; ADMIRALTY LAW; TAX.

**ASSETEAGUE**, ăs'sē-tēg', **ISLAND.** A small island off the east coast of Virginia, forming a part of Northampton County (Map: Virginia, J 4). It is surmounted by a brick lighthouse 129 feet high.

**AS'SETS** (Lat. *ad satis*, up to what is enough). One of those terms in the law of England which in itself bears evidence of a Norman origin. It is derived from the French word *assez*, or more exactly, in Norman-French, *assetz*, 'enough,' or 'sufficient,' signifying the property of a deceased person, which is sufficient in the hands of his executor and heir for the payment of his debts and legacies. In strictness, therefore, the term is not applicable to the property of a person who dies intestate or without any debts to be paid. In general acceptation, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or trading association, or to a bankrupt or insolvent.

Assets, in the law of administration, are either *personal* or *real*, the former comprehending such goods, chattels, and claims as devolve on the executor, and the latter including all real estate, whether devised or descending to the heir at law. Assets are also characterized as *legal* or *equitable*, according to the nature of the remedy which may be used by creditors against the executor or heir. These distinctions were important in connection with the common law rule that the realty of a deceased person was liable only for the payment of specialty debts (i.e., debts secured by a sealed instrument, as a bond), unless made liable for the payment of other debts by will. In the former case the specialty creditor was compelled to proceed against the heir or devisee; and in the latter case simple contract creditors might proceed against the executor to recover from either the real estate devised or from the personal property of the decedent. In the case of equitable assets courts of equity made no distinction in their distribution between specialty and simple contract creditors. Under modern statutes sometimes certain classes of debts such as taxes or funeral expenses are given a preference, but generally all creditors are placed on an equal footing, and, where there are several creditors, no one can, by anything done after the death of the decedent, secure priority over any other. If, after exhausting the whole assets which have come into his hands, by the payment of debts in due order, the executor or administrator is afterward sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or, technically, by a plea of *plene administravit;* and upon this plea the creditor is entitled to judgment that he shall be paid out of any other assets that shall come to the defendants, which is called a judgment of assets *in futuro*.

Assets is not a technical term in Scots' law, but it is nevertheless much used in the legal business of that country. Consult the authorities referred to under ADMINISTRATION; BANKRUPTCY; DISTRIBUTION; INSOLVENCY.

**AS'SIDE'ANS.** See CHASIDIM.

**ASSIENTO**, à-syĕn'tō (Sp. *asiento*, seat, contract, treaty). A word specially applied to a compact between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. It was Charles I of Spain who first concluded an assiento with the Flemings in 1517. Next, a similar compact was entered into with the Genoese (1580), the Portuguese (1696), and on the accession of Philip V to the Spanish throne, in 1701, with the French Guinea Company, which from that time took the name of the Assiento Company, upon the understanding that for 10 years it should have the exclusive right of annually importing 4800 negroes into the continent and islands of Spanish America. The assiento was next transferred to England at the Peace of Utrecht, in 1713, and made over by government to the South Sea Company for 30 years, permission being also granted to the company to send yearly, during the term of contract, a ship, carrying 500 tons of goods, to these Spanish colonies. The misunderstanding that grew out of this last clause, of which England took advantage to carry on an extensive contraband trade, contributed not a little to the war that broke out between the two nations in 1739. By the Treaty of Aix-la-Chapelle the South Sea Company was confirmed in its title to the assiento for a period of four years, but this right was surrendered in the Treaty of Madrid, Oct. 5, 1750 in return for £100,000.

**ASSIER**, à'syā', ADOLPHE D' (1828– ). A French traveler and philologist, born at Labastide de Séron. He became professor of mathematics and member of the Academy of Sciences at Bordeaux, and made numerous voyages abroad, results of which are embodied in the works: *Le Brésil contemporain, races, mœurs, institutions, paysages* (1867); and *Souvenirs des Pyrénées* (1872; 3d ed., 1885). He also published various other important works, of which the following are devoted to philology: *Essai de grammaire générale, d'après la comparaison des principales langues indo-européennes* (1857); *Histoire naturelle du langage; Physiologie du langage phonétique* (1868); *Le langage graphique* (1868).

**ASSIGN', ASSIGNEE'.** In the most general sense "to assign" means 'to convey or transfer to another any property right or interest.' At the common law the term was specifically applied to the transfer of personal property and, in a still more limited sense, to the transfer of *choses in action* (i.e., claims for money due or to become due; negotiable paper after maturity, and the like). To-day the term is generally employed, especially in the United States, as equivalent to the grant, conveyance, or transfer of any property right, whether real or personal.

An assignee (sometimes shortened to "assign," as in the phrase "heirs and assigns") is a person to whom property or a right, as above defined, is transferred; the assign or assignee becoming invested with the rights formerly belonging to his assignor. Under some circumstances a person in whom property is vested by operation of law, as an executor or administrator is known as an *assignee in law* as distinguished from the ordinary assignee above described, who is known as *assignee in fact*.

The term "assignee" has a special and distinctive use to designate one to whom under an insolvent or bankrupt law, the whole estate of a debtor is transferred to be administered for the benefit of creditors; thus, "Assignee for the benefit of creditors," "Assignee in bankruptcy." See BANKRUPTCY; INSOLVENCY.

**AS'SIGNA'TION.** A legal term in Scotch conveyancing, analogous in meaning to the English word "assignment" and "conveyance," signifying the process by which the holder of any property right, or the creditor in any obligation, or the proprietor of any property not strictly feudal, transfers his right or estate to another. See ASSIGNMENT; CONVEYANCE.

**ASSIGNATIONS** (Lat. *ad*, to + *signare*, to sign; cf. ASSIGNATS). The paper currency of Russia, issued by Catharine II, about 1770, to assist in carrying on the war against Turkey. Like similar experiments in other countries, before and afterward, the assignations started at par, but rapidly declined to less than 25 per cent. About 20 years later the assignations were the general currency; but traders began to refuse them, and the most stringent edicts of Paul failed to force them into good standing. In the war with Napoleon heavy issues were made, the value keeping steadily at about 4 rubles of paper to 1 of silver. The rate rose somewhat after the peace, and fluctuation became so troublesome that the government fixed the value by special law. In 1839 the silver ruble was made the unit, and the value of assignations fixed at 3½ for 1 of silver. At the same time bills of credit were issued which took the place of the assignations.

**ASSIGNATS,** ȧ'sē'nyȧ' *or* ăs'ĭg-năts (Fr. *assignat*, from Lat. p.p. *assignatus*, assigned, from *ad*, to + *signare*, to sign). Paper money issued during the French Revolution, which derived its name from the public domain *assigned* for its ultimate redemption. One of the earliest acts of the Revolutionary authorities was the confiscation of lands belonging to the crown and the Church, to which later the estates of the *émigrés* were added. These lands were to be used as a source of income for the state, but the process of selling was too slow to meet the pressing needs of the treasury. The government therefore issued what were practically treasury notes (q.v.), bearing interest at 5 per cent, for the total amount of 400,000,000 livres (francs). They were to be retired within five years from the proceeds of the sales of the national lands which were assigned to this purpose.

When first issued, the notes were sold in the market in the same way as treasury notes in our own history. They were in fact securities, the lowest denomination being of 200 livres ($40), and on the first issue, in December, 1789, were well received and suffered no depreciation. By a decree of April, 1790, these notes acquired a legal tender character, and the interest upon them was reduced to 3 per cent. The payment of interest was suppressed in October, 1790, after the maximum issue had been increased in the preceding month to 1,200,000,000 francs.

After this date the successive issues of this paper money became more and more rapid. As early as 1791 notes of 5 francs appeared; and later, notes of 10 sous (one-half franc) were issued. So rapid was the issue of notes that the record of their amount is lost; the formality of passing laws was omitted, and the executive authorities increased the issues by simple decrees. By the year 1793 the circulation had reached nearly 4,000,000,000 francs, but the actual value of the notes had sunk to one-fifth their nominal value. Futile efforts were made to sustain the value of the notes. An effort, late in 1793, to fund them, and thus restrict their quantity, proved ineffective, while penal provisions, culminating in a decree of Sept. 23, 1793, punishing the refusal to take them in payment, or taking them at a discount, with death and confiscation of property, were equally powerless. The wholesale issue of paper money could only have the most disastrous results. In July, 1794, 100 francs in paper were valued at 34 francs in coin; but in January, 1795, the value had fallen to 18 francs, and in July of the same year was less than 3 francs. In February, 1796, when the issues were finally abandoned, 100 francs equaled about 30 centimes in coin. The whole issue of money had been upward of 45,000,000,000 francs. It was now proposed that the assignats be redeemed at the rate of 30 to 1 in a new form of paper money known as territorial *mandats*. The mandats had this advantage over assignats, that they enabled the holder to take possession of public lands immediately, while the assignats could be offered only in lieu of the purchase price at a sale. As much as 1,400,000,000 of this money was issued, but it soon lost any value which it might have had and was finally repudiated by the refusal of the government to receive it at its own treasuries. By a law passed in July, 1796, it was enacted that every one was entitled to transact business in whatever medium he pleased, and that mandats might be taken only at their current value in private transactions, as well as in the payment of taxes. On May 21, 1797, all outstanding assignats were declared void. This riotous issue of paper worked rank injustice and a complete redistribution of the national wealth. If its history is comparatively unknown except in generalities, it is because it was only one of a vast number of measures which reversed the whole order of society during the Revolutionary period. Consult René Stourm, *Les finances de l'ancien régime et de la révolution française* (Paris, 1885).

**ASSIGN'MENT** (from Lat. *ad*, to + *signare*, to sign). In law, a transfer or making over to another of any property, real or personal, or of any right therein. The term is usually,

although not with strict accuracy, applied to a transfer in writing, as distinguished from a transfer whose validity depends upon mere delivery or unwritten agreement; and it is more frequently applied to the transfer of personal property than of real property, which requires to be transferred by an instrument under seal, and which at early common law required other formalities, not referable to the doctrine of assignment, in order to effect the conveyance. The formal words of assignment are: *assign*, *transfer*, and *set-over*. At common law all personal property in being, and other property not yet in being, but having potential existence (as crops planted but not yet grown, the wool to be grown by the assignor's flock of sheep within the year, etc.) could be freely assigned, and the assignment vested a present property right in the assignee. Courts of equity also recognize assignments of property to be created *in futuro* when such assignments are made for value, and enforce them against the assignor whenever this property comes into existence. At common law, the assignment of a chose in action, other than commercial paper, was forbidden, as violating the rules against maintenance (q.v.) and champerty (q.v.). Such assignments, nevertheless, conferred upon the assignee the right to sue in the assignor's name, and, if the assignment was made for value, equity would restrain the assignor from interfering with the assignee's rights thereunder. To this rule, however, there were certain exceptions, based on grounds of public policy. Thus equity refused to protect the assignment of the salary of a public officer or judge, rights of action based on personal torts, etc. In the United States, generally, assignments of legal choses in action capable of manual delivery, such as bonds and insurance policies, when accompanied by delivery, are protected by courts of equity, although made without consideration. Equitable choses in action have always been held assignable, although the assignment is made without consideration; and in the United States to-day legal choses in action are generally made subject to the same rule by statute.

An assignment for the *benefit of creditors* is an assignment of real or personal property, or both, to a trustee, usually made by an insolvent debtor for the protection of his creditors and to obtain discharge from further obligations. These are regulated by special statutes in each jurisdiction. See BILL OF SALE; CHOSE IN ACTION; BANKRUPTCY; INSOLVENCY; CONTRACTS.

**ASSIM'ILA'TION** (Lat. *assimilare, assimulare*, to make like, from *ad*, to + *similis*, like, similar) IN PLANTS. The term "assimilation" is used in at least two ways by plant physiologists. Most of them include under the term all the processes involved in the transformation of inorganic materials (salts, carbon dioxide, and water) into the tissues themselves (cell walls and protoplasm). In this sense the term includes the synthesis of carbohydrates, fats, proteins, and other substances, along with the transformation of these into the tissues. The term thus used is synonymous with anabolism, and stands in contrast to digestion, fermentation, and respiration, or catabolism.

Sometimes the term is applied to the processes of changing the synthesized organic materials into the tissues—the carbohydrates, fats, proteins, etc., into walls and protoplasm. Concerning the process of transforming soluble carbohydrates and allied substances into wall structures (cellulose, hemicellulose, pectin, etc.), it is now quite well established that enzymes (q.v.) are active, at least in the later stages. These enzymes are included under the general head of cytocoaguloses. Concerning the transformation of proteins, carbohydrates, fats, and lipoids, all entering into the composition of protoplasm, into living protoplasm itself we know but little. Proteins constitute more than 50 per cent of protoplasm, but it is not known to what extent they are tied chemically to the carbohydrate, fat, and lipoid constituents. It is known that physically the protoplasm is a colloidal gel or sol. (See COLLOID.) As a disperse system it is far less stable than the gels and sols of most proteins. This is shown by the fact that protoplasm is more quickly coagulated by heat, especially of medium intensity, than are most proteins. Unlike proteins, also, even pressure or mechanical agitation may coagulate protoplasm. Such coagulations may be incipient or reversible or they may be permanent. In the latter case death results. The instability of the protoplasmic colloidal system is one of the marks of living matter. This may be in part due to the nature of the proteins entering into its composition or in part to the combination of the proteins with other compounds. With the lack of definite knowledge concerning the chemical constitution of protoplasm, and in the absence of very definite knowledge concerning its physical state and structure, it is not strange that little that is definite can be said concerning the synthesis of protoplasm. See CELL; PROTOPLASM; PHOTOSYNTHESIS; CHEMOSYNTHESIS; NUTRITION; FOOD OF PLANTS. For assimilation in animals, see NUTRITION.

**ASSING**, äs'sĭng, LUDMILLA (1827–80). A German biographer and translator, the niece of Varnhagen von Ense. As an orphan she was adopted by her uncle and received a superior education. She wrote for newspapers and reviews and published in 1857 a biography of Elise, Countess von Ahlefeldt. She edited and published, after her uncle's death, Alexander von Humboldt's letters to him; also her uncle's memoirs and his diaries (14 vols., 1861–71). The political matter in the diaries so offended the court that she was prosecuted and sentenced to eight months' imprisonment. But she had gone to Florence, and the punishment could not be inflicted. She immediately published the remaining volumes of the obnoxious diary, to which the court answered by the form of a trial and sentence to further imprisonment for two years.

**ASSINI**, äs-sē'nē. A seaport village and trading centre in the Baule district, French Sudan, Africa. It lies between Lake Tando and the sea, on the Ivory Coast, about 80 miles west of Axim and 120 miles west of Cape Coast Castle. Logging is the principal industry, and much coffee is grown. Pop., 3000.

**ASSINIBOIA**, ăs-sĭn'ĭ-boi'ă (Ojibwa, *asinni*, stone + *bwa*, the Dakota). Formerly a district in Canada, formed in 1882 out of the Northwest Territories, containing 88,879 square miles (of which 600 square miles are water). It was bounded on the north by the former district of Saskatchewan, on the east by Manitoba, on the south by the United States, on the west by the former district of Alberta. The eastern third of the district belongs to the second or middle plateau and has an average elevation of about

1600 feet. The remainder of the district to the west belongs to the third or west plateau, with an average elevation approaching 3000 feet. The precipitation is light, and the temperature is subject to great extremes of heat and cold. The severity of the winters is often moderated by the warm chinooks from the west. The greater portion of the district consists of prairies. The eastern plateau is best adapted to agriculture, there being a great deal of very excellent wheat land, and mixed farming is practicable. In this section the agricultural industry has developed notably in recent years. On the western plateau there is a greater variety of soils, and it is not so well adapted to cultivation, but is excellent for grazing purposes. Lignite is found in a large portion of the district and is mined in the southeast corner. Regina was the capital of the district and also of the Northwest Territories. In 1905 the district of Assiniboia was divided between the newly created provinces of Alberta and Saskatchewan, by far the greater portion going to the latter. For further details see ALBERTA; SASKATCHEWAN.

**ASSINIBOIN**, ăs-sĭn'ĭ-boin ('stone-boilers,' a name given by some of the Algonquian tribes, and supposed to allude to their former method of boiling water by dropping hot stones into it). A tribe of Siouan stock, formerly roving over the plains between the Missouri and the Saskatchewan, on both sides of the Canadian border. They are said to have been originally a seceded band from the Yankton Dakota, and speak a dialect of the Dakota language, but are generally considered as a distinct division. In 1904 there were 1234 on reservations at Fort Belknap and Fort Peck, in Montana, while the remainder, amounting, in 1902, to 1371, are on reservations on the other side of the line in British America. Consult R. H. Lowie, "The Assiniboine," *Anthropological Papers, American Museum of Natural History*, vol. iv (1910).

**ASSINIBOINE.** A Canadian river, with two large affluents, the Qu'Appelle and Souris rivers, rising in Saskatchewan, and flowing east into the Red River at the city of Winnipeg (Map: Manitoba, K 5). From the source of its principal headwater, the Qu'Appelle, in the southeast of Saskatchewan, to its outlet in the Red River, it has a course of 450 miles. Drainage basin, 52,600 square miles. The river derives its name from the Assiniboin Indians. See ASSINIBOIN.

**ASSISI**, ȧs-sē'zē (anciently, Umbrian, *Assisium*). An episcopal city in Umbria, central Italy, 15 miles east of Perugia (Map: Italy, G 4). It is famous as the birthplace of St. Francis, whose body rests here in the crypt of the first monastery of the Franciscans, which he founded in 1208. The monastery was suppressed in 1866, and part of the building was converted by the government into a school for the sons of teachers. Its two churches, built one above the other, also date from the thirteenth century, and contain many old and valuable paintings and other objects of interest. Besides the "convento sacro," there are 11 other monasteries, of which the largest is the Portiuncula, which has a richly decorated church with a cupola by Vignola. Every year, at the beginning of August, Assisi is visited by great numbers of pilgrims. There are in evidence the remains of the ancient Assisium, including the forum, baths, and aqueducts. In the piazza stands a beautiful portico of the ancient temple of Minerva. There are olive groves and mineral springs in the vicinity. Manufactures are insignificant. Pop., 1881, 6704; 1901 (commune), 17,378; 1911, 18,587. Consult Cruikshank, *The Umbrian Towns* (London, 1901), and Gordon, *Assisi* (1904).

**ASSIST'ANCE**, WRIT OF. The process issuing from a court of equity to a sheriff, marshal, or similar officer, for the enforcement of an order or decree for the possession of lands. In England this process is now styled a writ of possession. Formerly the latter term appears to have been confined to process for the enforcement of a decree for the possession of a leasehold interest in land; and in some of our States it is used to denote the process for enforcing a judgment in a common-law action for the possession of lands, while like process from a court of equity is called a writ of assistance. During our Colonial period writs of assistance were issued by the courts to officers of the customs, authorizing them to take a constable or other public officer, and to enter any building and there to seize, and thence to bring, goods upon which customs duties had not been paid. For a learned discussion of these writs, consult Quincy, *Reports, Superior Court of Judicature, Province of Massachusetts Bay, 1761–72; With an Appendix upon Writs of Assistance* (Boston, 1865). See OTIS, JAMES.

**ASSIUT**, or **SIUT**, ăs'sē-o͝ot'. A city of upper Egypt, situated near the west bank of the Nile, in lat. 27° 10′ N., 248 miles south of Cairo (Map: Egypt, C 2). In very early times it was a place of importance, owing to its favorable situation in the midst of a fertile district at the starting point of the great caravan route leading to the oases of the Libyan desert and the Sudan, but it has lost some of its commercial greatness because much of its trade has been diverted. It was the seat of worship of the deity Wep-wat, who is represented in the form of a jackal or wolf, and hence in later times the city was called by the Greeks Lycopolis, or 'Wolftown.' Under the twelfth dynasty the monarchs of Assiut seem to have maintained great state, and their rock-hewn tombs in the vicinity are richly adorned with sculptures and paintings and contain inscriptions of great historical value. Plotinus, the greatest of the Neo-Platonic philosophers, was born here, and about 205 A.D. the city and the adjacent district were converted to Christianity. Many anchorites took up their abode in the neighboring necropolis, and one of these, John of Lycopolis, is said to have predicted to Theodosius his victory over Eugenius in 394. The modern town is situated on the Nile Valley Railway. It has several fine mosques, a college, bazaars, good baths, and well-built houses. It is noted for its pottery and extensive manufactures of the best pipe bowls. There is trade in linen, embroidered leather goods, carved ivory, corn, and fruit, and fine tulle shawls are made. It is the residence of the Governor of Upper Egypt. Pop., 1882, 31,575; 1907, 39,442. Consult: *Description de l'Egypte* (Paris, 1809–29); Lepsius, *Denkmäler* (Berlin, 1849–58); Mariette, *Monuments of Upper Egypt* (London, 1877); Griffith, *The Inscriptions of Siût and Dêr Rîfeh* (ib., 1889).

**ASSIZE'** (Lat. *assidere*, to sit by, from *ad*, to + *sedere*, to sit). Originally, in English law, a jury sitting together for the trial of a cause. Later, the term came to signify the court which summoned the jury by a commission of assize.

In the plural form, "assizes," it is the equivalent of circuits, and is applied not only to the judicial assemblies of the superior courts in the various counties, for the trial of civil and criminal cases, but also to the sittings of such courts. The term is used, too, as synonymous with edict, or decree, or even with law. A *writ of assize* was an action to recover possession of land, so named because it commanded the sheriff to summon a jury, or assize. It was of great importance in the early history of the law of real property in England, but was superseded by the writ of ejectment and other simpler remedies. *Rents of assize* are the rents of freeholders or copyholders, which had been fixed in amount by the assize of the freeholders of a manor and continued by custom, as distinguished from arbitrary rents or rents fixed by agreement. Consult Blackstone, *Commentaries on the Laws of England.*

**ASSIZE OF CLAR'ENDON.** See CLARENDON, ASSIZE OF.

**ASSIZE OF JERU'SALEM.** The name given to a body of laws in the Latin kingdoms of Jerusalem and Cyprus, formerly supposed to have been compiled by Godfrey de Bouillon, but dating in reality from a later period. The assize consisted of two parts, the Assize of the High Court, and the Assize of the Court of Burgesses. In the "Key to the Assize," "assize" is defined as "everything which one has seen in use and customary in the kingdoms of Jerusalem and Cypress." This aids in determining the much-debated question of its history. The Assize of the High Court was probably a body of customs, unwritten for the most part, until Jean d'Ibelin, about 1255, attempted to frame them into a code. In order to give importance to his compilation, he inserted at the beginning a historical sketch, in which he states that the assize had been framed by Godfrey de Bouillon and deposited by him in the church of the Holy Sepulchre, and that this code had been lost when Saladin conquered Jerusalem. This account is now recognized as fabulous. The book of Ibelin was reworked twice, in 1368 and in 1531, and the present text is based upon the latter redaction. The Assize of the Court of Burgesses was probably framed in the second half of the twelfth century, but the date is a disputed point. The two codes, together with the comments of jurists of the thirteenth century and later, throw much light upon the history of the kingdom of Jerusalem, but the Assize of the High Court must be used with great caution, as it is a document of the sixteenth century, and as it has been revised twice to suit the needs of principalities other than the Latin kingdom of Jerusalem; for the assize passed from Jerusalem to Cyprus, and later to the Morea, and was adapted to meet the needs of the later kingdoms. The best edition is by Beugnot in the *Recueil des historiens des Croisades* (1841–43). The Assizes of Antioch have been discovered, in an Armenian translation, and published, with a French version, at Venice, in 1876. Consult Dodu, *Institutions monarchiques dans le royaume latin de Jérusalem* (Paris, 1894).

**ASSMANNSHAUSEN,** äs'måns-hou-zen. A village in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, about 3 miles below Rüdesheim. It is celebrated for its red wine, made of a Burgundy grape and distinguished for its aromatic flavor, and its uncommon strength and fire. There are mineral springs and baths. Pop., 1895, 1100; 1900, 1000.

**ASSO'CIATED PRESS.** See PRESS ASSOCIATION; NEWSPAPER.

**ASSOCIATE PRES'BYTERY,** or THE SECEDERS. See PRESBYTERIANISM.

**ASSOCIATE SYNOD,** sĭn'ŏd, ASSOCIATE PRESBYTERY. See PRESBYTERIANISM.

**ASSO'CIA'TION.** See COÖPERATION; SOCIETIES; COMPANY. In psychology, see ASSOCIATION OF IDEAS.

**ASSO'CIA'TIONISM.** See ASSOCIATION OF IDEAS.

**ASSOCIATION OF IDE'AS.** The phrase "association of ideas" seems to have been first used by the English philosopher, John Locke, although the facts to which it gives expression were often discussed long before Locke's time. Even as early as the time of Aristotle, we find four classes of association described; that is, four ways in which the mind passes from one idea to another. These are association by similarity, by contiguity, by contrast, and by succession. It was not, however, till the time of Hume that the principles of association became "laws" which were intended to explain not only the way in which idea follows idea, but also the means by which the mind builds up all its knowledge of the world. Hume conceived of association as a "gentle force" arising in "original qualities of human nature," and "pointing out to every one those simple ideas which are most proper to be united into a complex one." Since the days of Hume the principle of association has played a very large part in various systems of philosophy, particularly among the writers of the empirical school of philosophy in England. It has been worked out most elaborately in the writings of James Mill, Alexander Bain, and Herbert Spencer. At times the advocates of the doctrine have gone so far as to speak of association as a law as universal in the mental world as that of gravity in the physical world. The theory thus developed is known as associationism; a theory which sees in the laws of association the fundamental modes of mental action.

Association has now a different significance among writers on psychology. In the works to which we have referred it had not so much a psychological as an epistemological significance (see EPISTEMOLOGY); i.e., it was regarded as a principle of explanation of our knowledge of things. As thus conceived, associationism implied an atomic arrangement of the mind, and furnished rather an external and mechanical means for putting the various elements of knowledge together than an intrinsic mode of synthesis. It is only very gradually that the association of ideas has come to lose its philosophical flavor within psychology, and to represent a grouping of mental processes instead of standing as an explanation of experience in general. But even within modern psychological systems it has received so many shades of meaning that it is hard to define. It has stood (*a*) as the one mode of connection of ideas; or (*b*) as the sole condition of reproduction, i.e., the way in which "past" ideas are brought again to mind; or (*c*) as reproduction itself—as when one is said to associate black with sorrow; finally, (*d*) it has signified a particular kind of grouping of mental elements. Let us see in what directions these conceptions are open to criticism.

First of all, we will examine association as

the one mode of connection of ideas. This definition of association is too narrow. Unless we are content to make association a perfectly arbitrary thing, we must extend it beyond ideas. When, e.g., we look at a stone, we seem to see a heavy, hard, rough, cold, resisting mass. What we actually see is, of course, only the "look" of the stone; the shape, the color, and the brightness. We "think in" the rest from what our past experience has told us of the "properties" of the stone. This "thinking in" is just the same kind of an operation as is to be found in association. We have a sense-experience completed by ideational elements. (See SENSATION; IDEA.) Since there is no successive "calling up" of the parts, and since we have not a grouping of idea with idea, it is plain that we cannot speak of an association of ideas. We must rather speak of this form of connection as a *simultaneous association*.

From this simplest form of associative grouping we pass by short stages to the *successive association*, the association in which part follows part. Even here it need not be a sequence *of ideas* which is experienced. A *perception* may start the train. The sight of the stone may bring the verbal idea "geology," and this, in turn, the idea of the Carboniferous period, and so on. It is only in cases of abstraction—as in reverie—that our primitive pilot, perception, is off duty, and we are guided by the central nervous processes underlying ideation.

We may dismiss the theory that association is the sole cause of reproduction (the second definition) by pointing out that the previous joining of ideas is not the only cause for the reproduction of one by another. This may be due—to mention only two exceptions—to mood (we are likely to recall melancholy events when we are in a melancholy mood); or to a similar relation which two ideas chance to have to a third (as when "dog" reminds us of "cat," both standing in the class of domestic animals). But neither is association satisfactorily considered as reproduction or recollection itself. It becomes in this case only a subheading under memory, and tells us nothing of the relation in consciousness of process to process. This leaves us with only our final definition, which says no more than that when sensational and ideational elements group themselves under certain conditions they may be said to associate. Association then becomes simply the form of grouping in which the elements stand united. Let us look more closely into this group. First, we must distinguish between the processes which do the associating and the materials united in association. In the simultaneous association, it is always the sensational elements which start the association. These it is in the case of the stone which make the perception a stone-perception instead of a table- or a wall-perception. It may happen, however, that a tendency toward reproduction of certain ideas wholly diverts the normal course of the association or the assimilation, as it may be called. Think, for example, of the apprehensive traveler who comes upon the stone in the dusk and takes it for a ghastly head. Or it may be mood, or sentiment, or temperament, or a violent emotion, which determines the course of the perception. Take, as an illustration, the transformation of the stone by poetic fancy into a treasure-casket or a plaything of the gods. When we look again, at the level of the successive associations, for the critical portion of the perception or idea, the part which does the associating, we find that it may be a single element or the whole perception or idea which is the determining factor. The red (sensation) in a sunset may bring the idea of blood; or a geometrical figure (perception) may suggest the arrangement of petals in a flower; or a melody (perception) an opera in which it has been sung.

The consideration of association as a form of mental connection removes one more difficulty which the older associationism encountered. It makes a more intimate relation within a perception or a train of ideas than the latter could posit. There is a unity in the associated members. We may even speak of a whole perception or train of ideas as being "bright," "vivid," "pleasing," as if it were a single thing. This would hardly be appropriate if the connection were entirely external and simply brought the elements into juxtaposition.

If, now, we are to speak of "laws of association," we can mean only the conditions under which a given association is made. These conditions will stand in place of the regularity with which the environment brings together certain groups of stimuli and presents them to the organism. Conceiving our laws thus, we find that the old category of contiguity comes nearest to expressing the truth of the matter. Similarity is a very doubtful rubric. In the first place, the term is too indefinite to be of much service. Almost anything may be considered more or less similar to anything else, and it is very hard to see how simple likeness should determine an association. At least, greater likeness does not seem to mean greater associability. It seems to be possible, in every case, to reduce an apparent "association by similarity" to some other form; there may be partial identity, in which case the identical member of two groups is first experienced with the one and then with the other, as the red of the sunset passing over into the red of blood; or there may be simple contiguity, the similar objects having stood together in experience; or there may be an indirect association, such as we found above, where two things stand in the same relation to a third, as two objects to the name of the class to which they belong.

On the other hand, "contiguity" can be regarded as an explanation only when we think of it in terms of neural activity. It is true that we can state it in general psychological terms, saying that conscious connections once set up tend to persist, so that when a single item (sensation, fusion, perception) comes to consciousness, it tends to bring with it other items with which it has appeared before in consciousness. This formula, which may be regarded either as a law of habit—if we think of the tendency to persist—or as a law of redintegration—if we think of its results—receives, however, its full significance only when we translate it into physiological terms and state it as a tendency in the nervous system to do that which has been done before. Neural tracts which have once been excited together tend to functionate together again; hence if an excitation finds its way to one part of the brain, there is a tendency for the parts previously involved to be reëxcited. Now, just what path an excitation will take in any particular case we cannot foretell; but we are able to name with a good deal of certainty the factors which contribute to association, i.e., to state the conditions under which the tendency to form old connections are realized. At this point

experiment comes to our aid. It enables us to invite association under first one set of conditions and then another and to watch the results. If a given process, *a*, has formed several connections, at various times, say, with *d*, *s*, and *z*, the one of these connections which is actually realized when *a* is brought to consciousness will depend upon the frequency of connection of each with *a*, the recency of connection, the relative vividness of *d*, *s*, and *z*, their relative positions in a series of processes, and their relative power to attract a wandering attention. The comparative values of these factors are determined by presenting to the observer simple stimuli (as colors, letters, or sounds), arranged in definite groups of two, and then asking him, when the one member of a group is given again, to recall the other member which was previously given with it. The series are so arranged as to bring into prominence, one after another, the various factors.

In investigating association, we have not only to give a quantitative measure of associability in terms of sensational elements; we must also study (1) the influence of other processes which chance to stand in consciousness, and (2) the nature of the associative consciousness; i.e., we must note what there is in mind when an association is being made. The first of these problems is illustrated by the overwrought traveler who "colors" his association by his apprehensiveness, or by the proof reader who becomes interested in his page and easily overlooks typographical errors. The case is brought under experimental conditions by giving an incentive to reproduction under the influence of a suggested idea. If the word "part" is seen an instant, for example, just after the word "wine" has been pronounced, it is likely to be read "port." The experiment shows us (*a*) within what wide limits an association may be influenced by the appropriate, momentary trend of consciousness, which thus becomes part-incentive, and (*b*) it also illustrates the last condition of association named above; the greater power to fascinate the attention and to start associations possessed by an idea when it bears a close relation to other contents of consciousness. The best way to solve our second problem—the analysis of associated contents—is to make the observer as much at his ease and free from distracting influences as possible (seat him, say, in a dark room), and ask him to report in outline the associative train which follows from a word or sentence repeated to him. After this experience he is able to fill in the outline by describing minutely the nature and the amount of the associative material, whether made up of visual, or auditory, or other imagery, whether intense or weak, whether clear or obscure, whether full or thin; the number and arrangement of the ideas, the elements which carry the association and the changes in affective disposition at the various stages of the process.

One other point connected with the analysis of associated contents deserves to be noticed. There is a well-marked tendency toward economy in mental functions. The mind becomes expert, as does the body, so that after carrying through laboriously a sequence of processes for some time, the operation becomes gradually curtailed. We think our thoughts out (if, indeed, we do not take them ready-made from our parents and neighbors), and then just use them as counters with a swift, shorthand review, without going through the trouble to "think" or "reason" every time we want to know. This mental ellipsis is common in the process leading to association. It is, as John Stuart Mill says, "like a stream which, breaking through its banks, cuts off a bend in its course." If we have the sequence *a b c* given several times, we become able to pass directly to *c* from *a* without the intermediate link *b* being given at all; e.g. *alarm—fire—loss*, and then *alarm—loss*. This is only another evidence that contents in an association form a whole, and not a mere sequence of events. Some psychologists have gone so far as to say that associations may be held together by a link which has never entered into consciousness at all. The evidence for this is not good, although it is a fact that often the links are hard to find, either because they are fleeting or because they are not attended to. A speaker's facial expression or gesture may recall, for example, an event or a place, even if the listener's attention is kept on the discourse. Nevertheless, a full attention is an indispensable aid to the forming of permanent associative relations.

Beyond the search for conditions of association and the analysis of association, much work has been done on the duration of association and of its elements by the use of the reaction experiment. (See ACTION.) The time, for instance, is taken for the associating of an object seen or heard, with the idea of another object in the same class, as "cat"—"dog." The time depends both upon the factors in the association (each one of the conditions mentioned above exerting an influence), and upon the individual associating. The individual factor is resolvable into differences in ideational type (the kinds of ideas —visual, auditory, tactual, etc.—which the individual uses with greatest facility), and what have been called "differences in intellectual temperament," i.e., the tendency to associate general names to the names of individuals (the superordinating temperament), as man to Cæsar; or individual to generals (the subordinating temperament), as Cæsar to man; or to associate ideas upon the same level of generality (coördinating temperament), as plant to animal. Moreover, experiments have also revealed individual differences in associative furniture as conditioned upon age, sex, training, physical state, mental disposition, etc. The results show that, given the conditions, the normal individual tends to form associations in certain definite ways and within regular time intervals. It has been found possible, therefore, to devise "association-tests" which are of service in the study of insanity, feeble-mindedness, hysteria, and in the detection of crime (as in Jung's diagnostic association-tests). See MENTAL TESTS.

When we have made a full analysis of the mind during association, and when we have a complete tabulation of the conditions under which association takes place, and have measured the temporal course of association, we shall have solved the problem which association presents to psychology. Even now (and experiment on association is comparatively new) we know that frequency, recency, vividness, position, and ability to attract the attention are real conditions upon which association depends; they are the credentials, so to speak, which gain for processes a place in consciousness. We are not to understand by this that past experiences are waiting in the ante-chamber of the subconscious; but only that by reason of frequent repetitions, or recent excitations, or what not, there is a ten-

dency for nervous processes to discharge in such and such a way. So that neural disposition determines the direction of discharge, and this, in turn, the appearance in consciousness of the associated contents. This view of the matter makes it clear why there is no distinct bit of consciousness answering to the associative bond, but only conscious processes standing related, and hence more or less unified. The bond is a figure. More than this, we have set the time relations of the association and have learned that associated contents are now exceedingly rich and now a mere thread; that the mass is now intensive and now weak, now clear and now obscure, now directed by a single element and now by the union of two or more streams of influence, now run through with pleasantness and now affectively indifferent; that successive association is, like every consciousness, kaleidoscopic, picking up processes here and dropping others there, but carried always by a common core, so that there is never a jump from one stage to another, never an hiatus within the chain, but invariably a gradual transition from point to point. These facts make clear to us that the old contention regarding the "laws" of contiguity, similarity, contrast, etc., was, after all, a secondary matter, and that it is the analysis of the contents collected within the association and the factual conditions of association that are of prime importance.

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**ASSOCIATIONS FOR THE ADVANCEMENT OF SCIENCE.** See ADVANCEMENT OF SCIENCE, ASSOCIATIONS FOR THE.

**ASSOCIATIVE LAW.** One of the fundamental laws governing certain elementary processes of mathematics. It is first met in addition, being stated thus: The sum is the same in whatever way the addends are grouped, e.g., $(2 + 3) + 5 = 2 + (3 + 5)$; or, in general, $a + (b + c) = (a + b) + c$. The associative law of multiplication may be stated thus: The product is the same in whatever way the factors are grouped, e.g., $2 \cdot (3 \cdot 5) = (2 \cdot 3) \cdot 5$; or in general, $a \cdot (b \cdot c) = (a \cdot b) \cdot c$. Exponents and vectors are subject to similar laws.

**ASSOLLANT,** ȧs'sȯ'lăn', JEAN-BAPTISTE ALFRED (1827–86). A French writer. He was born in Aubusson, in 1852 visited America, and on his return published *Scènes de la vie des Etats-Unis* (1858), a series of brilliant and skillful sketches. He wrote a number of stories and romances, such as *Brancas* (1859), *Marcomir* (1873), and *Pendragon* (1881), and contributed to many of the leading Parisian journals. His political articles forcefully and bitterly attacked alike Imperialists and Opportunists. A charge of plagiarism was brought by him against Sardou on the ground that the latter's *L'Oncle Sam* was copied from *Scènes de la vie.* A court of authors decided in favor of M. Sardou.

**ASSOMMOIR, L',** lȧ'sȯ'mwȧr' (Fr. the bludgeon). A novel by Emile Zola, belonging to his early "realistic" period, and dealing with the evils of drunkenness among the poor. It was published in 1878.

**AS'SONANCE** (Fr. from Lat. *ad,* to + *sonare,* to sound). A substitute for rhyme, consisting of a repetition of the same stressed vowels at the end of a line, without regard to the consonantal sounds of the syllable. It was common in the early verse of the Romance peoples, and it has survived in popular poetry, being, in English, usually styled "imperfect rhyme," as "man" and "dam." Examples of assonance, taken from George Eliot's *Spanish Gypsy,* are *blackness* and *dances,* and *roaming* and *floating.* Assonance is much employed in Spanish poetry. See SPANISH LITERATURE.

**ASSOS.** See ASSUS.

**ASSUAN,** ȧ-swän', or **ASWAN** (Ar. *al,* the + *souaan,* the opening—i.e., at the mouth of the Nile). The ancient *Syene* (Gk. Συήνη). A town, the capital of a province of the same name in upper Egypt, on the east bank of the Nile, near the borders of Nubia and at the first cataract, about 40 miles north of the Tropic of Cancer (Map: Egypt, C 3). In Assuan and vicinity are many ruins, among which are the remains of a Ptolemaic temple dedicated to Isis of Syene, tombs, etc. The town is a popular health resort and centre for tourists. Modern structures include the government building and hospital, an English church, bazaars, hotels, etc. In the environs are Arab cemeteries, an interesting Arab camp, and many granite quarries, which were worked under the earliest Egyptian dynasties. Some red granite—"Syenite" from Syene, so called by Pliny—is still found in the neighborhood. In the river just off the town and dividing the stream of the Nile is Elephantine Island, which is covered with verdant palm trees and which contains the ruins of the ancient town of Elephantine and several villages. On the west bank of the Nile there are many rock-hewn tombs of the Old and Middle Empires. The Roman poet Juvenal, whose keen satire was resented by the Imperial court, was banished to Syene, and lived there for some time as commander of the garrison. At one time Assuan had an important caravan trade which declined after the Mahdist revolt. It has gained considerably in commercial importance because of railway connection established with Alexandria, and the stimulus given to agricultural interests by the completion, in 1903, of the great Nile dam near this place (see DAMS AND RESERVOIRS). Its population, including the suburbs, is, 1907, 16,125.

**ASSUMP'SIT** (Lat. 3d pers. sing. perf. of *assumere,* to undertake). The technical name of a form of action at common law. It was first used as a form of action on the case (see CASE) after the Statute of Westminster II (1285), in which the plaintiff pleaded that the defendant undertook to perform some act by doing or giving something, the breach of which undertaking resulted in damage to the plaintiff. If the defendant's promise or undertaking did not amount to the assumption of a common law duty, a breach of which would be a tort (q.v.), it was necessary for the plaintiff to allege and prove that he had given consideration—i.e., that he had given up a right or suffered a detriment in return for the defendant's promise—in order to show that he had suffered damage. This was the origin of the modern doctrine of consideration in the law of contracts. The action of assumpsit is now limited as an action on contract, and as quite distinct from actions on the case, notwithstanding their common origin. The term "assumpsit" is also applied, though less fre-

quently, to the promise, contract, or obligation of one against whom the action of assumpsit would lie. *Express* or *special* assumpsit is the form of the action employed to recover damages for the breach of a bilateral contract, either express or implied in fact—i.e., a contract in which the promise of one party to the contract is given in exchange for the promise of the other. It was not the proper form of action in which to recover on contracts under seal, the action in that case being in debt or covenant. *Common, general,* or *indebitatus* assumpsit is a form of assumpsit in which the use of that action was extended, for reasons now purely historical, so as to apply in nearly every case in which the common law action of debt would lie. It was used to recover a liquidated sum of money, as distinguished from mere damages, as in an action to recover the purchase price of goods sold and delivered, or for money lent. The obligation to pay the liquidated sum may arise from contract, express or implied; or, in the absence of contract, it may be an obligation imposed on the defendant by law, sometimes incorrectly termed a contract implied in law, and known to modern legal writers as a *quasi contract* (q.v.). Thus, *indebitatus assumpsit* was at common law the proper form of action in which to recover a penalty imposed by statute or money paid by mistake.

In modern times the use of this form of assumpsit has been still further extended, so as to cover nearly all cases where the defendant is under an obligation to pay a sum of money to the plaintiff, even though unliquidated, provided the money is not payable as damages. The various forms of declaration in *indebitatus assumpsit* were known as *common counts* (q.v.). The usual plea to the declaration in assumpsit is at common law *non assumpsit,* i.e., a general denial, under which the defendant may give in evidence any legal defense to the action which he may have. Consult Gould, *Treatise on the Principles of Pleading in Civil Actions* (Chicago, 1899).

**ASSUMP'TION,** capital of Paraguay. See ASUNCION.

**ASSUMPTION,** SISTERS OF. 1. An order of French nuns devoted to the teaching of girls, founded in 1839. It aims to combine secular education with religious training. The mother house is in Auteuil, a suburb of Paris, and is a famous school. The order has spread to other countries. 2. LITTLE SISTERS OF THE ASSUMPTION, an order for nursing the sick poor in their own homes and bringing to them the influences of religion. It was founded in Paris in 1865 and has spread to most of the countries of western Europe and to the United States.

**ASSUMPTION OF MO'SES.** The title of an apocryphal book giving predictions of a glorious future for Israel and exhortations to prepare for it by repentance and obedience to the law, put in the mouth of Moses before his death. Jude, verse 9, is a quotation from it. It was written in Hebrew or Aramaic, by a Pharisee, in Palestine, between 7 and 30 A.D., and is preserved only in a Latin translation. A critical translation in English was made by Charles (London, 1897).

**ASSUMPTION OF THE VIR'GIN MA'RY.** A festival of the Roman Catholic and Greek churches, celebrated before the sixth century, in both the East and the West, in commemoration of the assumption of the Virgin Mary into heaven. Both churches keep August 15, in memory of Mary's translation into glory, body and soul, by Christ and the angels.

**ASSUR,** ăs'sōōr. 1. The earliest capital of Assyria, situated on the western bank of the Tigris, about 37 miles below the place where the upper Zab enters the river, the modern Kal'at Sherkat. Before the Semitic conquest it seems to have had the Sumerian name A-usar, which was frequently used even in later times. On the lips of the invaders it became Assur, while Babylonians and Hebrews pronounced it Ashshur. It is probably referred to in Gen. ii. 14, where Tigris is said to go in front of, i.e., flow east of, Asshur, which would be true of the city but not of the country. The ruins were visited by Rich in 1820 and Layard in 1840, but systematic excavations were not undertaken until 1903, when the Deutsche Orient-Gesellschaft began the work that has continued to the present day. Parts of the ancient walls, quays, streets, palaces, and temples have been laid bare; objects of art, including statues of kings, and numerous inscriptions of great importance have been found. The temple of the god Asur was founded, according to one of these inscriptions, by Uspia, a King who must have reigned a long time before Ilusuma, the contemporary of Sumuabu (2232–2217 B.C.). The city wall was built by Kikia, another King reigning probably in the earlier part of the third millennium B.C. Enlarged and beautified by the various priestly rulers and kings of Assyria, Assur never ceased to be a great centre of the religious and political life of the nation. Even after Calah (Kalchu, modern Nimrud) in the fourteenth century had been made the seat of the government, and this city had given place to Nineveh as capital of the Empire, the Assyrian monarchs still continued their building operations in Assur. The city was destroyed by the Medes and the Chaldæans in 606 B.C. Consult *Mitteilungen der deutschen Orient-Gesellschaft* (1903–13); W. Andrae, *Die Festungswerke von Assur* (1913).

2. The country of Assyria, the chief part of which was after its occupation by the Medes called Adiabene. The Hebrews always used the name Asshur.

3. The chief god of the Assyrians. It is possible that the name originally was Anshar, as the identification with this Babylonian deity suggests. An assimilation to the name of the city would be natural. But it was also important to differentiate. Hence the god's name was generally written with only one sibilant, and that seems to have been pronounced by the Assyrians as an *s,* consequently Asur, a form conveying the idea that he was a 'helper,' 'savior.' In earlier inscriptions found at Assur and in the Cappadocian tablets, Asir also occurs. The worship of Asir and his spouse, Asirta, seems to have prevailed also among the Amorites of Syria. (See ASHER, ASHERA.) Asur was the tribal god of the Assyrians, as Chaldis was of the Chaldians; his relations to his people were as close as those of Chemosh to Moab, or Yahwe to Israel in earlier times. There were other gods besides him, but in the cult he was supreme. With his name those of numerous kings were compounded. To carry out his commands, to make his will respected, to spread the fear of his majesty, they went forth upon their expeditions. The trisagion sung in the temples of Assyria was "Asur, Asur, Asur!" Other gods had to contribute to his

glory. When Sennacherib had destroyed Babylon in 689, he ascribed to Asur the struggle with the chaos-monster Tiamat and the creation of the world which in Babylon were regarded as the achievements of Marduk. In Nineveh Istar was probably considered as his wife. Consult Zimmern, *Die Keilnschriften und das Alte Testament* (1902); Jeremias, *Das Alte Testament im Lichte des alten Orients* (1906); Jastrow, *Die Religion Babyloniens und Assyriens* (1902–12); Sayce, "Cappadocian Cuneiform Tablets from Kara Eyuk," in *Babyloniaca*, vol. iv, p. 68 (1911).

4. The eponymous hero of Assyria, represented in Gen. x. 22 as a son of Shem, and a brother of Elam, Arpachshad, Lud, and Aram. The Arabs refer to him as al Athur.

**ASSUR'ANCE.** See INSURANCE.

**ASSURBANIPAL,** äs'sōōr-bä'nē-päl'. See SARDANAPALUS; ASSYRIA.

**AS'SUS,** or **AS'SOS** (Gk. Ἄσσος). An ancient Hellenic seaport city in the Mysian Territory, Asia Minor, on the north shore of the Adramyttium Gulf, opposite, and 7 miles distant from, the coast of the island of Mitylene (ancient Lesbos), in existence as early as 1000 B.C. The city rose in terraces from the shore, on a trachyte cone, 700 feet high, crowned by a temple of Athene, commanding a magnificent view. The site, now partly occupied by the village and seaport of Behram or Bekhram, is noted for its interesting archæological remains and historical associations; the extant walls are concededly the finest known example of Greek fortification building; the larger part goes back to the fourth century B.C. Strabo mentions the independent attitude of Assus during the latter Persian invasion. During the governorship of the eunuch Hermeas—a pupil of Plato—Xenocrates and Aristotle were invited guests at his court, and Aristotle married the ruler's niece. Later, Assus passed under the domination of Lysimachus and of the kings of Pergamum. On their way from Troas to Mitylene, St. Paul and St. Luke visited Assus, as recorded in Acts xx. 13. After the Byzantine period it sank into oblivion. From Assus came the Stoic philosopher Cleanthes. In ancient times Assus was famous for grain and for its building stone. In later times the city's remains became a prolific quarry of building stone, especially for the docks built at Constantinople after the Crimean War, but the scattered remains of the walls, the baths, the marketplace, the temple of Augustus, treasury, gymnasium, and the temple of Athene, attest the city's ancient magnificence. The American archæological school at Athens has done much to make the treasures of Assus known. Consult J. T. Clarke, "Report on the Investigations at Assus" in *Papers, Classical, of the Archæological Institute of America* (Boston, 1882–98).

**ASSYRIA** (Gk. Ἀσσυρία and Ἀτουρία, *Aturia;* OPers. *Athura;* Aram. *Athur, Attur,* and *Athuriya;* Bab. and Heb. *Asshur;* Ass. *Assur*). The ancient name of the country between the Armenian mountains in the north and the alluvial plain of Babylonia in the south, the Tigris in the west, and the mountains of Kurdistan in the east, as well as of the Empire ruled by the Assyrian kings, which included a varying extent of adjacent territory. As Mesopotamia during a long period, Babylonia at various times, and a large part of Syria for a while, belonged to this Empire, the Jews seem to have continued to employ the term occasionally, after the destruction of Nineveh, to the Achæmenian (Ezra vi. 22) and the Seleucid (Zech. x. 10 f.) kingdoms. Some of the classical writers use Assyria in such a manner as plainly to include Mesopotamia and Babylonia; and it is altogether probable that Syria is an abbreviation of Assyria. After the fall of the Assyrian Empire, the name "Adiabene" (q.v.) came to be used for the chief part of Assyria proper. Trajan, in 115 A.D., created a Roman province of Assyria, but this attempt to restore the old name was abandoned by Hadrian. Athuriya survived as the designation of a Nestorian diocese.

**Topography.** Assyria consists of a plain broken up by low ranges of hills into a number of shallow valleys. Through these the great tributaries of the Tigris flow—the upper Zab, the lower Zab, the Adhem, and the Diyala—and many smaller streams, such as the Husur, northwest of Nineveh. The Tigris itself forms the western border of Assyria proper. Because of its ample supply of water, the plain is very fertile. The rainfall is good, and in ancient times an extensive system of canals was kept up for irrigation. Cereals, olives, vines, citrons, and other fruits were cultivated. Vegetables of various kinds were grown. The land was in part covered with woods. Iron, copper, and lead were found in the hills; and limestone, sandstone, alabaster, and basalt could be cut in the neighboring mountains. The fauna was rich and varied, including lions, wild bulls, bears, foxes, jackals, boars, and deer, a large number of birds, and all the domestic animals.

**Cities.** Assur, the oldest capital, was situated on the western bank of the Tigris, near the modern Kal'at Sherkat, half-way between the upper and the lower Zab. Calah, which was made capital by Shalmaneser I (c.1320), stood on the site of the modern Nimrud just north of the upper Zab, on the eastern bank of the Tigris. Nineveh, which is mentioned in the prologue to the Code of Hammurapi (2124–2081), but does not seem to have been made a capital before Asurbelkala (c.1100) and not permanently until Sennacherib, was farther north in the angle between the Husur and the Tigris, east of the latter. Its site is represented by the mounds of Kuyunjik and Nebi Yunus opposite Mosul. The capital of Sargon II, Dur Sargina, was found at Khorsabad, north of Nineveh. The important city of Arbailu, the later capital of Adiabene, is the modern Arbela, and Imgur Bel corresponds to the mound called Balawat. Besides these there were many smaller towns.

**Excavations.** The destruction of the chief cities of Assyria by the Medes, avenging themselves for centuries of wrong and oppression, came suddenly and with terrible thoroughness. Their temples and palaces were given to the flames. They never rose from their ruins; in course of time they were completely buried by the earth, and other towns grew up around them. The mounds that covered them aroused no suspicions of hidden treasures. Not until 1842 were excavations begun. Paul Emile Botta undertook to examine a mound at Khorsabad and found that it contained the remains of a magnificent palace of Sargon II. Three years were spent there by Botta. During this time he unearthed numerous chambers of the palace, revealing an abundance of inscriptions, sculptured slabs, statues, and other objects of art. Meanwhile Sir Austen Henry Layard was making preparations for work in the mounds op-

posite Mosul. He began his excavations in 1845 and continued them at Kuyunjik and at Nimrud until 1850. Layard thus was the modern discoverer of Nineveh and Calah. No less than five palaces and several temples were found by him. He discovered a part of Asurbanipal's library, of which some 30,000 fragments were sent to the British Museum. The French excavations begun by Botta were continued at Khorsabad by Victor Place in 1855 and Jules Oppert (1859–62). Under the direction of Sir Henry Rawlinson, Hormuzd Rassam, a native of Mosul, began excavations at Kal'at Sherkat in 1852, and continued until 1854 at Nimrud and at Kuyunjik, where he discovered another large portion of Asurbanipal's library. In 1873 and 1874 George Smith conducted excavations at Kuyunjik and Nebi Yunus; and Rassam again was in the field from 1878 to 1882. From 1903 to 1913 extensive and methodical excavations have been carried on by the Deutsche Orient Gesellschaft at Kal'at Sherkat under the leadership of Andrae. The finds have been very rich, and the numerous inscriptions discovered have been promptly interpreted by Professor Delitzsch. See ASSUR.

**Chronology.** For the last 300 years of Assyrian history the chronology is in the main very well established. It is based chiefly upon what remains of the *limmu*-lists. In Assyria every year was named after a high official. From the Cappadocian tablets we know that this institution already existed in the third millennium B.C. Like the archontate in Athens and the consulate in Rome, this eponymate, or *limmu*, may be a sign of an original republican form of government, as Ed. Meyer has suggested, *Geschichte des Altertums*, i, 2, p. 539 (2d ed., 1909). We possess several *limmu*-lists, with or without notes, discovered by Rawlinson and Bezold, and last published by Rogers, *Cuneiform Parallels to the Old Testament* (1912). They cover the years from 893 to 666. Usually, though not always, the King held this position in the first year of his reign, and then in a certain rotation the governors of important cities and provinces. Chronologically the succession has been fixed by the reference to an eclipse of the sun in the month Sivan of the eponymate of Pursagale, of Guzana, which took place on the 15th of June, 763. From the third year of Nabunasir (745), when Tiglath-pileser IV became King, the *Babylonian Chronicle* and the *Canon of Ptolemy* are of great importance, and for the earlier part of the period the *Synchronous History*, published by Peiser and Winckler in *Keilinschriftliche Bibliothek* (1889). Only the regnal years of the last three kings cannot be given. The accuracy of Assyrian chronology back to the end of the tenth century is of value also for that of the Syrian states in this period. See JEWS.

From c.1400 to 911 we are at present able to construct a fairly complete list of kings, but not to determine the exact date and regnal years of a single king. Nevertheless the margin of uncertainty is not in any case very wide. Two statements of Sennacherib, based no doubt upon accurate *limmu*-lists, help to fix the time of Tiglath-pileser I and of Tiglath Ninib I. The former is said to have suffered the loss of two gods, Adad and Sala, taken away from Ikallati by Marduknadinahi 418 years before Sennacherib destroyed Babylon, in 689, and brought back these deities to the Assyrian city (*Bavian Inscription*, 48–50), consequently in 1107. A seal of the latter was carried away by Sennacherib on the same occasion, and the conqueror of Babylon added that this conquest took place "after 600 years," evidently counted from the time of Tiglath Ninib (III *Rawlinson*, 4, 2, translated in *Keilinschriftliche Bibliothek* (1889), consequently in 1289. Unfortunately, these dates do not indicate when the two kings began to reign. The references to Babylonian kings whose dates are fixed (see BABYLONIA) and the *Synchronous History* are also of value. From the Amarna letters it is known that Asuruballit II was a contemporary not only of Burnaburiash of Babylon but also of Amenhotep III and Amenhotep IV of Egypt, whose dates have been approximately determined by Egyptian documents.

More uncertainty prevails concerning the period from c.2250 to 1400. We have the names of about a score of kings, perhaps one-half of the whole number, but, in spite of apparently very precise chronological statements, it is extremely difficult to assign even an approximately correct date to more than a few of them. Among these must probably be reckoned the first King, Ilusuma, and his immediate successors, Irisum, Ikunum, and Sargon I, as Ilusuma's enemy, Suabu, in all probability is identical with Sumuabu, the founder of the first Babylonian dynasty (2232–17). Concerning the two important kings, Samsi Adad I and Samsi Adad II, there are several perplexing statements. Tiglath-pileser I (*Cylinder Inscription*, 60 ff.) says that Samsi Adad, son of Isme Dagan, built on the Anu and Adad temple in Assur, but that it fell into disrepair for 641 years, when it was torn down by Asurdan, after which it lay in ruins for 60 years until it was rebuilt in the beginning of his own reign. One year of his reign, 1107, is known, but that may have been his last, and we have no means of finding out when he began to reign. It may have been as early as 1140. If so, Samsi Adad, son of Isme Dagan, would have built on this temple c.1840. Shalmaneser I, on a stone tablet found at Assur, states that the Asur temple built by Irisu was rebuilt by Samsi Adad, after a period of decay lasting 159 years; after 580 years it was destroyed by a fire, and then was rebuilt by himself. On the other hand, Esarhaddon, in an inscription on a prism found at Assur in 1904, says that after Irisu there came 126 years of decay, then a rebuilding by Samsi Adad, son of Belkapi, and a destruction by fire 434 years later. If this son of Belkapi is the same as the Samsi Adad who reigned in the tenth year of Hammurapi (2124–2081), mentioned in a legal document from Sippara published by Ranke, *Babylonian Expedition*, vi, 1, p. 9, there would be room for 126 years, but not for 159, between him and Irisum. The conflict between Ilusuma and Sumuabu may have taken place at the end of the former's reign and in the beginning of the latter's. Irisum may then have built on the Asur temple c.2226, and Samsi Adad, son of Belkapi, c.2100. It is possible that the fire occurring 434 years later (c. 1666) was an earlier one than that referred to by Shalmaneser. If Tiglath Ninib I was defeated by the Babylonians at the beginning of his reign, and Shalmaneser I, his father, inscribed the stone tablet at the end of his, the 580-year period, counted from 1290, would give the date of 1870 for Samsi Adad. There can

scarcely be any doubt that this is Samsi Adad, son of Isme Dagan, referred to by Tiglath-pileser I. He seems to have rebuilt the Asur temple early in his reign, and restored the Anu and Adad temple some 30 years later. There may have been a confusion on the part of Shalmaneser's scribes of the two Samsi Adads, and a further mistake of 33 years in estimating the period from Irisum to Samsi Adad I. Though some uncertainty still exists, these data seem to indicate that Samsi Adad I, son of Belkapi (or Belkapkapu) reigned c.2115–2095, and Samsi Adad II, son of Isme Dagan, c.1870–40. Concerning the time when Uspia built the Asur temple and Kikia the wall of Assur nothing is known, but it must have been many centuries before Ilusuma.

**Ethnology.** The Assyrians were a people of Semitic stock, akin to the Akkadians, Chaldæans, Arrapachians, Gutians, Lulubians, Amorites, Aramæans, Hebrews, and Arabs. But on the monuments they exhibit a distinct and easily recognized type. The closeness of their relationship to the Akkadians has probably been exaggerated. There is no historic evidence that they were a colony sent forth from Babylonia. Language alone is not a sufficient criterium. Amorites, Kassites, Chaldæans, Gutians, and Lulubians spoke and wrote the language of Akkad. There were differences of pronunciation, however, notably in the case of the sibilants. While the cultural influence of Babylonia was at all times very great, and the worship of many gods, together with much mythological material, passed into Assyria from the south, it is significant that Asur was never worshiped in Babylonia, nor Marduk in Assyria. Adad and Dagan did not come from Babylonia, nor is it necessary to suppose that Samsu and Sin were derived from there. Distinctly Babylonian gods never occur in the proper names of Assyrian kings. The difference in physical environment, climate, and natural resources between the two countries is not so great as to account for the difference in national character. A certain fierceness characterizes the Assyrian, showing itself in the torture of prisoners, the impalement of rebels, and the mutilation of the slain. The Assyrians are generally regarded as having preserved their racial purity better than their southern neighbors, and maintained themselves as a more homogeneous people. This is quite possibly true. Yet the land was probably to some extent occupied when the Semites came in. No Sumerian inscriptions have yet been found in Assyria. But the earliest kings known, Uspia and Kikia, have names that certainly are not of a Semitic type. Winckler suggests that they are Mitannian (*Vorderasien im zweiten Jahrtausend*, p. 67 (1913)). Whoever the aborigines may have been, a process of assimilation is likely to have ensued. The Mitannian conquest of a large part of Assyria and the later conquest of Mesopotamia by the Assyrians must have affected the nature of the population. Amorites, Hittites, Iranians, and Aramæans formed the largest constituent of the new province to the west of Assyria and poured into the capitals on the Tigris. The policy of deporting people from one end of the Empire to another likewise exercised its influence upon the ethnic character of the population.

**History.** The Assyrians do not seem to have drawn up lists of dynasties like those of the Babylonians. One reason for this may have been the eponymate, another the apparent absence of any periods of foreign domination. There were indeed palace revolutions, usurpers, and founders of new families establishing themselves upon the throne. But until these changes are better known than they are to-day, it may be expedient to adopt some other method of division. Periods may be marked by the appearance of great rulers extending the power of Assyria and forcing the political development into new channels. Such a scheme is naturally subject to revision, since fresh discoveries may bring to light rulers of greater prominence or reveal epochal events now unknown, but it may be followed for the sake of convenience.

*The First Period* (?–c.2250 B.C.).—It is impossible at present even to conjecture when Assyria was first inhabited by man, to what race the original settlers belonged, and at what time Semites began to occupy the land. The earliest known rulers in Assur were Uspia, who built the Asur temple, and Kikia, who constructed the wall of the city. From the term employed it cannot be determined whether Uspia was the original builder or simply restored and enlarged an already existing shrine. These names have a Hittite rather than a Semitic sound, and the deity to whom the temple was built may not have been Semitic. As to their date there is not the slightest indication. Kate Asir and Salimahum are clearly Semites, but it is not known when they reigned. Semitic kings of the Gutians and the Lulubians were contemporaries of Sargon I of Akkad (see BABYLONIA), and Semitic tribes may have settled in Assyria at as early a time. It is not impossible that before the end of this period Assyria had already pushed her power into Asia Minor. Sulili and Belbani, son of Adasi, may belong to this epoch.

*The Second Period* (c.2250–1870).—Ilusuma is the first Assyrian monarch whose date can be approximately established. Toward the end of his reign, apparently, he came into conflict with Sumuabu, the founder of the first dynasty of Babylon (2232–17). His son Irisum seems to have built on the Asur temple c.2226. His son was Ikunum, and his grandson Sargon I of Assyria. Sayce has shown that this Sargon, vassal of the god Asir, is referred to on the Cappadocian tablets (*Babyloniaca*, p. 67, 1911). By this discovery the date of the tablets found at Kara Eyuk has been fixed, and the fact established that the authority of the Assyrian rulers was recognized in the twenty-second century in Cappadocia. It is probable that his successor was Belkapi, whose son Samsi Adad I was a contemporary of Hammurapi (2124–2081) and is known by his building enterprises in Assur. The Hittites fell upon Babylonia in the time of Samsuditana (1963–32) and probably put an end to the dynasty; cf. King, *Chronicles concerning Early Babylonian Kings*, vol. ii, pp. 113 ff. (1907). But they must have crushed the power of Assyria in Cappadocia, and are likely to have punished Assyria herself, before they invaded Babylonia. It may not have been long after Sargon's time, in the twenty-first century, that the expansion of Hittite power began which pushed the Hyksos into Egypt, drove new ethnic elements into Mesopotamia, conquered Babylonia, and reduced Assyria to weakness. There is a certain similarity of the names of the kings to those of the first Babylonian dynasty, and it is not improbable that

the Ilusuma dynasty was also of Amoritish origin.

*The Third Period* (c.1870–c.1500).—A reaction seems to have set in with Samsi Adad II, son of Isme Dagan, who probably reigned from 1870 to 1840. He was a strong and resourceful ruler, claiming to have held dominion over the land between the Tigris and the Euphrates, to have received tribute from the kings of Tugrish, and to have erected monuments to himself "in the land of Labana on the shore of the great sea," by which either Lebanon and the Mediterranean or a district in northern Asia Minor and the Black Sea is meant. An inscription of his has been found on the Euphrates, south of the Chabur, in Tirka, the capital of Chana, where he built a temple to Dagan. His building activities in Assur were very extensive. We know the names of some of his successors, such as Isme Dagan II, Asurnirari I, Asirresisi I, Kisru sa Asir, a group consisting of Samsi Adad III, Adadnirari I, and Asurdan I, and, toward the end of the period, Asirrabu I and Asurnirari II, father of Asurrimnisesu. No exact dates can be given to any of them. It is not impossible that they still maintained some suzerainty over Mesopotamia and other regions in the west. Manetho may be right in stating that the Hyksos, expelled from Egypt about 1580, fortified themselves in Palestine rather than pushing farther north "for fear of the Assyrians" (Josephus, *Against Apion*, i, 90, ed. Niese).

*The Fourth Period* (c.1500–c.1320).—The Mitannians in Mesopotamia, invigorated by the infusion of a strong Iranian element, the Mithras and Varuna worshiping Harri, or Arrians, of Armenia, seem to have forced the Assyrians and the Kassites in Babylonia into peace with each other and an alliance probably for defense. Asurrimnisesu, son of Asurnirari II, and Karaindash entered into a covenant (*biritu*). This may have been as early as 1500. To all appearances Asurrimnisesu was an able monarch, maintaining his independence of Assyria, beautifying his capital, and strengthening its walls. But the power of the Mitannians was growing apace, and in less than a century northern Assyria, including Nineveh, was in their hands or at least in a condition of vassalage. Erba Adad I, Asurnadinahi I, Asururballit I, and Adad . . . may have preceded Puzur Asur, who was a contemporary of Burnaburiash of Babylonia (c.1381–56). Asurnadinahi II corresponded with Amenhotep III (1411–1375), and Asuruballit II with Amenhotep IV (1375–50). Belnirari, Arikdenilu, and Adadnirari II reigned between c.1350 and 1320.

*The Fifth Period* (c.1320–c.1140).—Shalmaneser I, son of Adadnirari II (c.1320–1290), conquered northern Mesopotamia and may have invaded northern Syria. He moved his capital to Calah, which remained the residence of the Assyrian kings, except for brief intervals, until Sargon II. His son Tiglath Ninib I after long wars conquered Babylonia and reigned over this country seven years, but was murdered by his son Asurnazirpal I. Assyria takes the place of Mitanni as suzerain of Mesopotamia in the treaty between the Hittite King Dudhalia and the son of the Amoritish King Benteshina (c.1250). During the time of Asurnirari III, Tiglath Asur, Belkuduruzur, Erba Adad II, Ninibpileser, Asurdan II, Mutakkil Nusku, and Asurresisi II the power of Assyria seems to have declined.

*The Sixth Period* (c.1140–911).—A great conqueror appeared again in Tiglath-pileser I (c.1140–c.1105), son of Asurresisi II. He subdued the tribes of Commagene and Melitene, went into Armenia, placed his statue on the Supnat, a tributary of the Tigris, pushed into Syria, visited the island city of Arvad, and reduced Babylonia to vassalage. His son Asurbelkala moved the capital to Nineveh. Concerning his successors Samsi Adad IV, Asurnazirpal II, Shalmaneser II, Adadnirari III, Tiglath-pileser III, Asurrabi II, Asurresisi III, Tiglathpileser III, and Asurdan III our information is scanty. Aside from occasional raids they seem to have allowed the Aramæans to establish their kingdoms in the neighboring Mesopotamia. and Babylonia to resume its independence.

*The Seventh Period* (911–745).—Adadnirari IV (911–890), son of Asurdan III, carried on successful wars with Babylonia. Tiglath Ninib II (890–885) waged war in Armenia (*Nairi*) and placed his stele on the Supnat. Extensive conquests were made in the north by Asurnazirpal III (885–860). In 882–881 he reduced the Zamua tribes in Media. He fought with the strong Aramæan kingdom of Bit Adini and captured its capital in 877, and received tribute from Hittite and Phœnician cities the following year. He resided at Calah, where he built the famous "North-West Palace." Shalmaneser III (860–825) defeated the King of Bit Adini and annexed his domain (859–856), whereupon he turned his attention to Damascus. In the great battle of Karkar (854) he met a coalition of Syrian princes led by Bar Hadad I of Damascus, among whom were Ahab of Israel and Gindibu, the Arab, and, in spite of his own assurances, the probability is that he was defeated. In 849, 846, 842, and 839 he made unsuccessful expeditions against Damascus, but Jehu of Israel sent him presents in 842. He was scarcely more fortunate in his wars with the Chaldæans in Armenia, but subdued some tribes in Media. Samsi Adad V (825–812) continued these wars in Armenia and Media as well as with Babylonia. Adadnirari V (812–783) defeated Bar Hadad II of Damascus, invaded Babylonia four times, and made raids into Media. The whole reign of Shalmaneser IV (783–773) seems to have been spent in attempts to check the growth of the Chaldian power in Armenia, which now held the leading place in western Asia. Asurdan III (773–755) still undertook invasions of Syria and Babylonia, but without marked success, and rapid decay characterized the reign of Asurnirari IV (755–745).

*The Eighth Period* (745–606).—Tiglath-pileser IV (745–728) was a usurper whose accession was probably due to a reaction of the military classes against the priests. The conflict with Sarduris II of Chaldia for supremacy in Syria ended in the victory of Assyria (743), and eight years later Turuspa on Lake Van was in part captured and destroyed. Ahaz of Judah became a vassal in 734; part of Galilee and Gilead were ceded by Israel in 733, and Damascus was taken in 732. In 729 Tiglath-pileser invaded Babylonia and seated himself on the throne, assuming the name of Pulu. It is not certain whether his successor Shalmaneser V (728–722) was his son. The chief event of his reign was the siege and capture of Samaria (Samarain) in 723; cf. Olmstead, *Western Asia in the Days of Sargon of Assyria*, pp. 45

ff. (1907), and see SAMARIA. Sargon II (722–705) was a usurper, probably raised to the throne by the priestly interests. In the battle of Durilu he was defeated by Humbanigash of Elam and the Chaldæan Mardukapaliddin, and the latter reigned for 12 years over Babylonia (721–709). But Hamath was taken in 720 and Carchemish in 717. He invaded Arabia in 715 and brought a large number of people from Hejaz to Samaria, whence he had deported 27,290 Israelites to Mesopotamia and Media. An insurrection in Ashdod was quelled by his *turtanu*, or commander-in-chief, in 711, and Babylonia was conquered in 709. Wars were also fought, with more or less success, in Armenia, Militene, Comagene, Cilicia, Cappadocia, and Ellip. Sargon built a splendid palace in his new capital, Dur-Sargon, the modern Balawat. He seems to have fallen in a battle with the Cimmerians in Cappadocia. His son Sennacherib (705–681) moved the capital to Nineveh, which he beautified in many ways. A large part of his reign was occupied by his struggles with Babylon. Here Mardukapaliddin again established himself in 703, and appears to have headed a formidable coalition against Assyria. He was indeed driven away in 702, and his allies in Syria, among them Hezekiah of Judah and Luli of Tyre, were forced to pay heavy tribute in 701. But his son Asurnadinsum, whom he made King of Babylonia, was carried away to Susa as a captive by Hallus of Elam in revenge for an invasion of his territory by the fleet sent out from Nineveh in 594. The conflict with Nergalushezib and Mushezib Marduk ended in the terrible destruction of Babylon by Sennacherib in 689. A fruitless attempt seems to have been made to invade Egypt about 683; the outbreak of pestilence obliged the King to return. He was murdered in 681. A greater king than Sennacherib was Esarhaddon (681–668). His first act as ruler of Babylonia was to order the rebuilding of the city of Babylon. He had to conquer Assyria from his brothers, who had murdered their father. In 674 he destroyed Sidon, but he was unable to take Tyre, though his statue at Zenjirli represents him as having put his hook in the nose of Baal of Tyre as well as of Taharka of Egypt. The greatest achievement of his reign was the conquest of Egypt in 673. The 22 nomes were constituted as kingdoms, and their rulers were made Assyrian vassals. Taharka escaped to Napata, but returned; and even Esarhaddon's second expedition in 671, when Necho I was made vassal king of Sais, did not establish very securely the Assyrian control of the country. Esarhaddon made a campaign into the interior of Arabia, fought with Cimmerians and Medes. With Protothyas (Bartatua), the Scythian King, he seems to have entered into an alliance. He died on his third expedition to Egypt. Esarhaddon gives the impression of having been a wise administrator and a humane ruler. Before his death he designated Asurbanipal as his successor in Assyria, and Samassumukin, a younger son, as regent in Babylonia. Asurbanipal (668–625) continued the Egyptian campaign, occupied Memphis, captured Thebes in 667, and restored, at least nominally, the authority of Assyria. In 663 he appointed Psammetichus I as vassal in Memphis and Sais in place of his father, Necho I. Some years later Psammetichus made himself independent with the aid of Gyges of Lydia, who apparently had reasons to regret his request for Assyrian assistance against the Cimmerians. From 665 to c.645 the war with Elam continued. In 652 the great rebellion of his brother Samassumukin broke out. Filled with ambition to achieve for Babylon and himself what was to be accomplished a generation later by Nabopolassar, he entered into alliance with various nations, declared his independence, and forbade Asurbanipal to offer sacrifices in the sanctuaries of Babylonia. After four years of struggle the Assyrian monarch captured Babylon, and Samassumukin perished in the fire of his burning palace (648). Since that time Asurbanipal himself ruled in Babylon under the name of Kandalanu. The greatest military achievement of his reign was the capture of Susa (c.645). It put an end to the kingdom of Elam and enriched Nineveh with the vast treasures accumulated by a long line of kings. Sippar, Borsippa, and Cutha were punished for their participation in the rebellion of Samassumukin; some of the inhabitants were killed, others seem to have been carried away to Samaria (Ezra iv. 10). During the last 20 years of his reign Asurbanipal devoted himself to works of peace. He beautified Nineveh and other cities with palaces and temples, and he gathered a very great library in the capital. Numerous scribes were employed to copy tablets in Uruk and Sippar, and independent literary work was encouraged. The memory of his magnificence survived the fall of the Assyrian Empire, and the Greeks, who seem to have called him Sardanapalus (Σαρδανατάλλος), exaggerated the luxury of his court and wrongly represented him as a weakling. It is true, however, that he allowed Egypt and Elam to slip out of his hands, and Phraortes to build up a powerful Median Empire with Ecbatana as its capital. His death brought about important changes. Nabopolassar, the Chaldæan governor of Babylonia, made himself independent and founded a dynasty. Cyaxares of Media, according to a cuneiform inscription, his "ally and helper," besieged Nineveh. He was defeated, however, and driven away by Madyas, son of Protothyas, the Scythian King (Herodotus, i, 103 ff.). By this timely assistance of the only ally Assyria had, the capital was saved, and the Syrian provinces were in a measure secured by the march of the Scythians to the border of Egypt to prevent Psammetichus from occupying Assyrian territory. Asuritililaniukin (625–c.618) seems to have been succeeded by Asursumlisir (c.618–c.616), and Sinsariskun (c.616–606) was the last King of Assyria. At length the two allies, Cyaxares and Nabopolassar, accomplished their end, the Medes probably doing the larger part of the work, as Assyria proper was to be their share. All the cities were destroyed.

**Government.** It is possible, though it cannot yet be proved, that the earliest rulers were elected annually and bore the title of *limmu*. Before it became an honor assumed by kings and conferred on governors, the eponymate is likely to have implied supreme power. But the growth of the priesthood naturally developed a theocratic form of government. The *isakku*, or high priest, of Asur became the head of the state. As the vicegerent of Asur he was his king (*sarru*). It is now certain that one of these titles does not exclude the other; and that the use of *isakku* alone does not indicate dependence on a foreign power. The king

of Assyria always remained ruler by the grace of Asur. But his military and administrative occupations tended to put a limit to his priestly functions and to facilitate the growth of a well-organized Asur priesthood pursuing its own ends. The king was not worshiped as a god. Nominally he was an autocrat. He is represented as accomplishing everything himself; he commands his armies, defeats his enemies, disposes of the booty, subdues kingdoms, builds cities, temples, and palaces, puts to death whom he pleases, saves whom he favors. No council is mentioned, and we do not know whether there was a written law as in Babylonia; it is rarely that the name is recorded of a general, a statesman, an official, an artist, or a builder. Yet the tartan (*turtanu*) was practically a wazir; his position is no doubt correctly represented in the old Ahikar (q.v.) romance. Many of the great victories were won, many of the campaigns planned, by generals, while the king remained quietly at the capital. The work of government was carried on according to precedent or the judgment of powerful officials without his personal participation. The authority and influence of the rab-saris, the rab-sake, the rab-mag, the rab-dupsari, the rab-sangu, must have been very great. Occasional revolutions and insurrections throw a light on the operation of these military, priestly, and bureaucratic powers within the state. The cities were ruled by governors; extensive privileges and exemptions were enjoyed by Assur, Calah, Nineveh, and Arbela, by Haran in Mesopotamia, and by certain Babylonian cities when they formed a part of the Empire. No careful study has yet been made of the provincial government. But it is evident that, as in the Roman Empire, different principles were followed in the case of countries that were attached to Assyria by a sort of personal union, those that were ruled directly by governors, and those that were treated as vassal states, subject to tribute, but allowed to have their own kings.

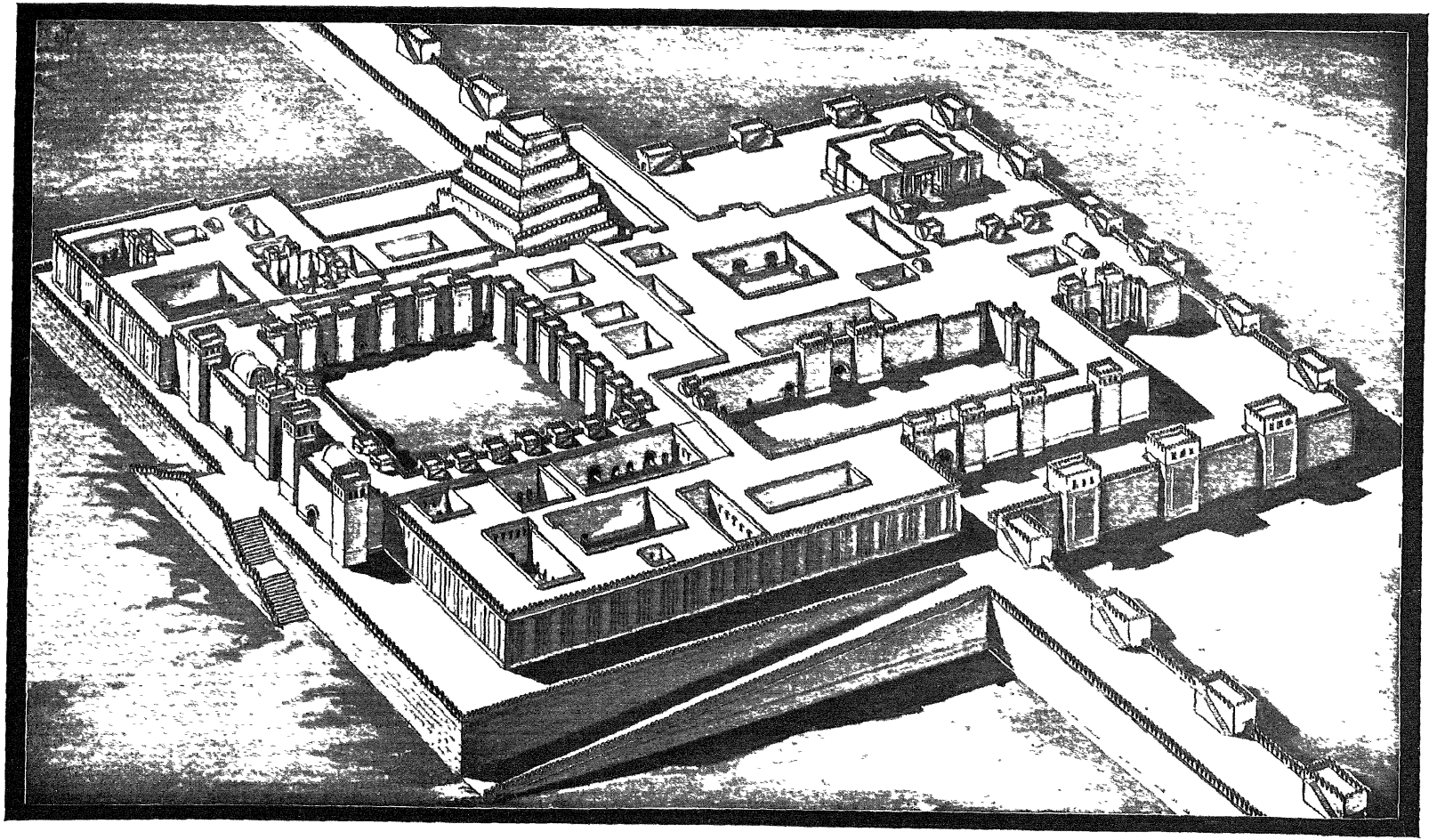
**Religion.** The chief deity of the Assyrians was Asur. In our earliest inscriptions he is generally called Asir. Originally the local god of the city of Assur, he became, with the growth of the kingdom, the national deity, as truly as Chaldis of Chaldia, Chemosh of Moab, and Yahwe of Israel. Besides him Istar occupies the most prominent place. In Nineveh her character as the goddess of love seems to have been emphasized, while in Arbela she appears predominantly as the goddess of war. Some oracles given by priestesses at the sanctuary in Arbela have come down to us. (See Astarte.) Dagan, probably an Amoritish deity (see Dagon), and Adad, who may have been of Aramæan origin (see Hadad), appear at an early time. Samsu, the sun god, was worshiped in Assyria, as everywhere in the Semitic world. The same is true of the moon god, Sin, especially after the conquest of Mesopotamia, where he had a famous sanctuary at Haran, though no prominent king has a name compounded with his before Sennacherib (Sin ahi erba). Esarra is of Hittite origin, and the true pronunciation of Ninib is still uncertain. Adad shared his temple in Assur with Anu, and the Sumerian gods Ea, or Ae, Ellil (probably pronounced Bel in Assyria), and Nergal, the god of war, were recognized. Babylonia naturally exercised a very strong influence, though it may have been somewhat exaggerated. There seems to have been a marked similarity between the forms of worship and the religious festivals in the two countries, and some Babylonian myths were evidently taken over by the Assyrians. Since no complete temple has been preserved, it is difficult to say whether Babylonia furnished the models. That some of the temples of Assyria were built of bricks may not be due to imitation but to practical considerations. It has been customary to look upon the large number of copies made by Asurbanipal's scribes from Babylonian temple archives as an evidence of the inferior culture of the Assyrian priesthood; but a considerable part of the library is evidently earlier than Asurbanipal's time, and it may be wise to await the results of more complete excavations before far-reaching conclusions are drawn. Such prayers as those offered to the sun god show genuine piety, and even the horror with which offenses against the majesty of Asur are regarded, and the pride with which his deeds are recorded, by the royal scribes reveal a sense of divine glory and transcendence as well as national feeling. Beyond a general trend toward monolatry and monotheism, there is no indication that Assyrian thought ever followed to the end the road that in Israel led to the worship of one god only. But the Assyrian gods were represented in human form, and Asur, the "father of the gods," was conceived of as the creator of heaven and earth. Concerning man's fate after death the Assyrians do not seem to have speculated much; even before their acquaintance with the story of Istar's descent to the nether world they are likely to have looked upon it as "the land of no return" which holds no attractions for the living.

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**ASSYRIAN ART.** The historic inscriptions show that the earliest rulers of Assyria in the seventeenth century B.C. built monuments and enriched them with images, with colored decorations, and with hangings. None of these early works has yet been found, but it is probable that they resemble the art of Babylonia even more closely than later works, because at first the Assyrians, being cruder in their culture, were more imitative than when their national characteristics found artistic expression after Assyria became a great power. Roughly speaking, the following periods may be recognized: (1) Babylonish, seventeenth to twelfth centuries; (2) Archaic, twelfth to ninth centuries; (3) Developed or Epic, ninth to eighth centuries; (4) Picturesque, seventh century. The temple and all forms of religious art predominating during the earliest centuries, had taken second place by the time of Asurnazirpal III (ninth century), and the building and decorating of the royal palace, the celebrating of royal victories, exploits, and every-day life became and remained the principal theme of Assyrian art, in harmony with the despotic and secular character of Assyrian institutions. It is a help in tracing its history that nearly every King built at least one palace to commemorate his reign, in which everything was executed by his royal artists. Successive shiftings of the capital to Nineveh, Calah, and Ashur helped to multiply royal constructions. Beginning in the reign of Asurnazirpal III, Assyria came in touch with every phase of Oriental art—Egyptian, Phœnician, Hittite, Ægean. The result was a strong reciprocal influence. Between the ninth and seventh centuries Nineveh was the centre of the entire East for art as well as commerce; here colonies of foreign artists settled, and imitated or transformed the strongly marked character of Assyrian art, sending their works, by the hands especially of Phœnician traders, over the entire civilized world. This Assyrian supremacy did not cease until the fall of Nineveh, about 607 B.C. In describing the character of Assyrian art, it is not easy to detach the other arts from architecture, because the construction itself, being of brick, was necessarily so plain, so devoid of special features, such as colonnades or elaborate moldings, that both relief sculptures and color decoration were used for effect and became an integral part of architecture. Cult images of the gods, often of precious metals, were placed in the temples, as well as reliefs with mythological subjects. Doors were covered with bronze-figured plaques or carved in wood; obelisks and stelae were set up in the open air; but the favorite form of sculpture remained the low-relief frieze, and the favorite material, soft limestone. The industrial arts were highly developed. The King and his courtiers dressed in superbly embroidered and figured stuffs; horses were superbly caparisoned—arms and armor were highly finished; the King's throne was of carved ivory and gold, and the King was served out of gold, silver, and bronze vessels, with figures in relief. The Phœnicians and Syrians in particular were cunning workmen, who supplied all that Assyrian luxury demanded, and life was then as luxurious as under the Roman Empire. The bronze gates of Balawat, the dishes and ivories from Nimrud now in the British Museum, the carved cylinders and gems there and in the Louvre, Metropolitan Museum, and De Clercq Collection, show the character of the smaller arts.

**Architecture.** The Assyrians copied the Babylonians far more closely in architecture than in the other arts. They employed brick in similar fashion, though they occasionally faced their substructures and walls with stone slabs as the Babylonians never did. Their temples were of the same stepped shape; their palaces on a similar quadrangular plan, with chambers also grouped around three courts. Color decoration was used, both outside in the form of reliefs of glazed faïence, and inside in wall paintings and in the coloring of the sculptured dadoes in all the large halls and passageways. But we cannot yet say that in these particular forms which the Assyrians gave to their colored decoration they were following Babylonian models. Certainly it seems as if they innovated in one very important particular, i.e., in the use of long lines of bas-reliefs for internal decoration. The alabaster and soft limestone which they quarried on their borders had not been available to their southern neighbors, the Babylonians; and in these materials the Assyrian sculptor reveled quite as much as had the Egyptian, and he carved on these slabs sculptures appropriate in subject for all the different parts of the palaces and temples. There is nothing to show how the Assyrians treated sepulchral or private architecture, though future excavations may do this. But their military architecture can be studied on several sites, especially at Dur-Sargina (Khorsabad). The use of crude brick for the mass of all platforms, substructures, and bulk of walls subjected the buildings to the same disintegrating process through infiltration of water, as in Babylonia, which made constant repair necessary and led to the collapse of the vaults after the buildings had been abandoned. In fact, the Assyrian practice of using the crude bricks before they were dry produced a sort of brick amalgam far softer and more destructible than the Babylonian; nor were the Assyrians so careful to face this *pesé* with hard-burned and enameled bricks as were the Babylonians. In the interiors they usually protected it below by the dado of sculptured slabs and above only by a thin layer of painted stucco. In one way the Assyrians had the advantage, by using quarried stone blocks for facing their foundations; but, again, they



ASSYRIAN ARCHITECTURE

PALACE OF SARGON—RESTORATION

did not use the good lime-mortar or beds of bitumen with which the Babylonians cemented their courses of brick.

The immensely thick walls—sometimes 20 and 30 feet—were made necessary by the great weight of the massive vaults and flat roofs, which made a second story impossible in palaces and houses, and also made it necessary to admit light from above, as windows cut through such walls would be almost useless. Both these facts made the residences extremely cool—a most important item in such a hot climate. Of course the Assyrian use of the arch, vault, and dome was rudimentary; each unit being supported on its solid walls, so that there were no long lines of arcades, no grouping of domes supported on piers. But there was a type of lighter architecture in accessories, such as porches and pavilions, shrines and small temples, summer-houses and belvederes. Here small columns of stone or marble or wood sheathed in metal (e.g., bronze), supported architraves and decorated roofs. Where fancy could have play without regard to structural necessities, we see the Assyrian supporting his columns on the backs of lions or sphinxes, surmounting their capitals with gazelles and antelopes. They here used capitals of at least two orders—cubic and Ionic—of extremely well-proportioned and appropriate types. But in these rather ephemeral works there lay such a contrast to the main buildings, with their heavy, unrelieved masses, that no harmony could be established between them.

The royal palaces of Assyria are its best preserved as well as most characteristic monuments. The religious fanaticism of the Babylonians had given to their temples the same preponderance that the civil despotism of Assyria gave to its palaces, in comparison with which the temples were insignificant. Long before Nineveh, the capital of Assyria was Calah, the modern Nimrud (q.v.). Here most of the prominent Assyrian kings from the thirteenth to the seventh century built or rebuilt palaces. The palace of King Asurnazirpal (885–860 B.C.) has been most systematically excavated and was the most artistic. That of Esarhaddon shows how, notwithstanding the dread of the curses called down upon such sacrilegious work, the pernicious habit was indulged in by the later Assyrian kings of despoiling older palaces to decorate their own. Nineveh itself is represented by the mounds of Nebbi Yunas and Koyunjik; only the latter has been excavated, especially the palaces of Sennacherib and Asurbanipal, whose sculptures decorate the British Museum. That of Sennacherib was magnificent. One of its vaulted halls measured 176 × 40 feet; another 124 × 30 feet. Many other mounds conceal superb palaces. One of these has been excavated with scientific care, the city and palace of Sargon at Khorsabad (q.v.), called Dur-Sargina, 'City of Sargon.' Sargon's own official account of its construction has been preserved in several inscriptions, and the ruins help us to understand it. Nothing in palace architecture of any age—not even Nero's Golden House—could have surpassed this Assyrian palace. It was built during 721–705 B.C., as a sort of Versailles to the neighboring Nineveh; it was never disturbed by later monarchs, and represents the plans of a single architect. As for the city, it formed an almost perfect square; it was on flat ground as usual. Its walls are about 80 feet thick, and their present height of 40 to 60 feet is but a fraction of the original height, which was, however, considerably less than the 348 feet given by Herodotus to the walls of Babylon. They were strengthened by about 167 towers. On each of three sides were two gates, one of which was the decorated state gateway for foot passengers, enriched with figured enameled bricks and sculptured bulls and winged genii. These gateways were immense edifices, covering 10,000 square yards, and their courts and vaulted halls and passages were the market places and forums of the city. The royal palace itself made a break in the city wall, being partly inside, partly outside the city line. Its plan includes 209 apartments. Its level was high above that of the city, and its outer wall was defended by towers. The area covered was nearly 25 acres (128,500 square yards). The arrangement of apartments in three general groups each around a main court, supplemented by other smaller courts, is the clearest commentary upon the conditions of ancient life in the East, which have been more or less handed down to modern times. First comes the *Seraglio* for the men, joined to the *Selamlik*, or state apartments. Second is the *Harem*, or private apartments of the King, his wives, and their attendants. Third is the *Khan*, or dependencies, offices, and storerooms. The Seraglio itself had 10 courts and 60 apartments. Each court, with its chambers and passages, was a separate unit. Even the largest state court could be used, by the help of awnings, for ceremonial occasions. The sculptures, enameled bricks, frescoes, colored stucco, marble pavements, and hangings made a gorgeous display.

**Sculpture.** When Layard, Botta, and Place made the first excavations in Assyria, it was the sculptures that excited the greatest amazement throughout the world. The colossal bulls and lions guarding the portals and the miles of scenes in low relief were unlike anything yet known in the history of art, and their interest was not merely artistic, since they furnished the most graphic information as to the life, costume, and history of the people. There are still gaps. A solitary female statue of the fourteenth century B.C. seems to hint that Babylonian models were then supreme, for its counterpart is found in earlier Babylonian terra-cottas and gems. But later works show that statuary was seldom produced, as the Assyrian artist never mastered its technique; the few remaining statues of kings—such as Asurnazirpal, Sennacherib, and Asurbanipal, or of divinities, like Nebo—when compared with the mass of relief work, show that the heart of the Assyrian sculptor was not in this branch of his art. He did not know how to model the figure under the drapery, nor had he learned to treat drapery in folds, but only as a smooth sheath. The colossal man-headed bulls and lions are in reality not works in the round, but in relief, standing out from a central block. Where the Assyrian sculptor showed his power was in the observation of Nature eye to eye, and his ability to reproduce his impressions with realism without descending to triviality. In the royal hunting scenes this is particularly striking. The lion standing regally in the royal park gazing down at the reclining lioness; the lioness shot through the spine and dragging along her paralyzed hind quarters; the mortally wounded lion gnawing his paws; the scene of the wild-ass hunt, with the various stages of watchfulness, panic, and flight, wounding and tearing down by hounds; the hunting hounds themselves led in

the leash—these and many more variations on similar themes are studies from life such as no other art has given us. Only the needlessly fastidious will carp at the amusingly primitive composition of some of these scenes, due to the entire absence of a knowledge of perspective. Each figure in itself is perfect; and when the artist confines himself to a simple frieze-like procession, as in the scenes of the return from the hunt with the dead animals, or the King in his chariot starting the game, his composition does not suffer even from this imperfection.

Up to the present no discoveries of relief sculptures have been made earlier than the time of Asurnazirpal in the early ninth century; but the art of his time, so powerful and complete, shows that probably even under the great Tiglath-pileser in the twelfth century Assyrian sculpture must have freed itself from its Babylonian swaddling-clothes. When this was happening, Babylonian sculpture, after a development of some 3000 years, had fallen into absolute decay, and such works as those of Meredachidinachi, lifeless and fussy, would have been incapable of inspiring a new art. In fact, the Assyrian sculptor found quite a new manner. Instead of the soft contours and delicate gradations of early Babylonian art, the Assyrian technique was sharp and clear-cut, the outlines distinct, the details given with accuracy. In the figures, the muscles, features, and hair; in the drapery, the patterns; and in the armor, harness, chariots, and other accessories—all the details are given with crisp touch. Doubtless the softness of the limestone that served as material helped the sculptor to realize his ideal, and to produce the immense quantity of contemporary annals in stone that amazes us. The realism was assisted by the use of color in figures, drapery, and accessories. The Assyrians in this polychromy of sculpture, as well as in the successful use of the frieze in low relief, were the worthy predecessors of Greek art. The sculptures themselves can be studied in European museums; there remain on Assyrian sites only the yet undiscovered works—probably numerous. Reliefs from Asurnazirpal's palace may be seen not only at the British Museum, whither the great bulk of them were taken, but also at the Gregorian Museum in the Vatican, at the Historical Society in New York, etc. They illustrate the simple, epic stage of Assyrian sculpture, and are mostly colossal figures arranged in a single row on the marble dado that decorated the rooms and corridors of the palaces. The figures are heavier and more strongly marked than later, and there are few or no accessories. What the course of development was during the next 150 years we can only surmise, for the next large group of stone reliefs is that of the palace of Sargon at Khorsabad, now in the Louvre, which shows the last stage of this epic style; it is still colossal and simple, but while the guardian lion of Asurnazirpal snarls and strikes terror, the man-headed bulls of Sargon are genteel colossi of colorless mien. The processions, also, have lost the early fire. The time was ripe for a change of style, which appeared under Sargon's successor, Sennacherib, whose reliefs show the advent of a novel picturesqueness. Figures are multiplied on a background often full of accessories, of landscape, and of buildings; in place of the majestic frieze of large personages, small figures are scattered everywhere. It is true that more respect is shown to art by not allowing the rescriptive inscriptions which accompanied the reliefs to be run straight across the figures, as hitherto; but the defects consequent on ignorance of perspective are made far more conspicuous. This introduction of the pictorial element, in order to infuse new life into the art, seems to have been successful; for the art of the succeeding generation—that of Asurbanipal, whose sculptures form the most fascinating group in the British Museum—shows the good qualities of both the old and the new schools. There is a riot of many figures in the battle scenes of the Elamite War; there is the quiet simplicity of the antique frieze in many hunting and banquet scenes. If we miss the greater force of the time of Asurnazirpal, there is an added delicacy.

The subjects of the reliefs fall into several categories: 1. Religious and mythological scenes were rare and belonged mostly to the temples, which have not yet been as fully explored as the palaces; there were statues of the gods and heroes, and reliefs of the conflict of Merodach with the dragon, the labors of Gilgamesh, and the wars of the evil spirits. 2. Scenes of contemporary history were particularly numerous. There were court sculptors who were as much the King's historiographers as were the writers. Every incident in the long war was portrayed in a fashion similar to that of the later artists in such works as the columns of Trajan and Marcus Aurelius. In such scenes as the battle of Susa, which completed Asurbanipal's conquest of Elam, each successive incident of the battle, even each separate phase of the duel of the two leading warriors, is given separately and side by side. It is a sort of moving panorama, which proceeds *pari passu* with the descriptive text. The Assyrian official annals of each yearly campaign are thus illustrated at every point. We see exactly how the Assyrian soldiers were armed and fought, marched, encamped, crossed rivers, attacked cities, slaughtered and tortured enemies, cooked, and sacrificed to the gods. 3. Scenes of daily peaceful life are only less numerous. The King banqueting with his Queen in the palace garden, or hunting lions, gazelles, or wild asses; the construction of a royal palace; the royal horses led to the river to be watered; incidents of court life and glimpses of the royal parks—all show the versatility of the artist. It is, however, true that far less use is made of such material than was the case in Egypt, where many more details of manners and customs are portrayed. The Assyrian artist cared more for the official acts of his sovereign than for the life of the people or for the mysteries of religion. Consult the bibliography given in the preceding article.

**AST,** äst, GEORG ANTON FRIEDRICH (1778–1841). A German philologist and philosopher. He became professor of classical literature at Landshut (1805) and at Munich (1826). Among his works were a *System der Kunstlehre oder Lehr- und Handbuch der Aesthetik* (1805); *Grundlinien der Geschichte der Philosophie* (1807); *Wissenschaftliche Darstellung der Grammatik, Hermeneutik und Kritik* (1808); *Platos Leben und Schriften* (1816), and an edition of Plato in 11 volumes (1819–32) with Latin translation and extensive notes.

**ASTAR BOARD.** See HELM.

**ASTARTE,** ăs-tär'tē. The woman whom the hero of Byron's *Manfred* had guiltily loved, and whose lovely shade appears to him at the close of the second act.

**ASTARTE, ASH'TORETH.** A goddess appearing frequently in the Old Testament (1 Kings xi. 5–33; 2 Kings xxiii. 13), where she is called the goddess of the Sidonians. The form of her name in the Masoretic text of the Old Testament appears to be due to intentional perversion, her real name being Ashtart, to the consonants of which late scribes assigned the vowels of Bosheth, 'shame,' thus producing the form Ashtoreth. Her worship was quite prevalent in the time of the Judges, and Solomon built a temple to her. Astarte was, however, not only the goddess of the Sidonians; the Bible mentions a temple of Astarte at Ashkelon (1 Sam. xxxi. 10), and from Semitic inscriptions we learn of a temple to Astarte at Citium in Cyprus, and at Eryx in Sicily, as well as in Carthage. It is fair to infer, then, that she was a Phœnician goddess. From Cyprus her cult was carried to Greece and appears as that of Aphrodite. Astarte herself is not original with the Phœnicians. In Assyria there is an Ishtar, "the Lady," "the Queen of the Gods," "the Goddess of War," the planet Venus; she, too, is the goddess of various localities, "Ishtar of Arbela," "Ishtar of Ninua," and she finally assumes a national position. In south Arabia there was a male deity Athtar. The inscription of Mesha, King of Moab, mentions an Ashtar-Chemosh. This has been supposed to be a male Ashtar; but in all probability it is an abbreviated form of Ashtart-Chemosh, the goddess Astarte as spouse of the chief god of Moab. Astarte is represented as a female figure, generally naked, rather short and round, with hands holding the breasts. Recent excavations in Palestine have brought to light a number of representations of this goddess. Astarte was regarded as the goddess of fertility, fruitfulness, and love. She is sometimes represented with her symbol, the dove, or in the form of a cow. There can be no doubt that Astarte is meant by the designation "Queen of Heaven." The plural Ashtaroth is often used in the Old Testament as a general term for "goddesses." Consult Jeremias, *Das Alte Testament in Lichte des Orients*, pp. 107 ff. (1906), and Gressmann, *Altorientalische Texte und Bilder*, vol. ii, pp. 79 ff. (1909).

**ASTAT'IC NEE'DLE** (unstable, from Gk. *ἀ, a*, priv. + *στατός, statos*, standing). A compound magnetic needle which has little if any directive power and is composed of two magnetic needles suspended parallel in the same system, but with their poles reversed. The effect of one needle is to neutralize the other, and the result is the same as if a very weak needle were placed in the magnetic field. The chief use of the astatic needle is in the astatic galvanometer, where great sensitiveness is required. Possessing but a slight directive power, it will deflect under the action of very weak currents of electricity in the surrounding coils. (See GALVANOMETER.) A simple description of the astatic needle and the astatic galvanometer will be found in Silvanus P. Thompson, *Elementary Lessons in Electricity and Magnetism* (New York, 1901).

**ASTAY'.** See ANCHOR.

**ASTEN,** äs'ten, FRIEDRICH EMIL VON (1842–78). A German astronomer. He was born at Cologne and studied at the University of Bonn. From 1870 he was connected with the observatory of Pulkova, Russia. He is chiefly known for his researches in connection with Encke's comet.

**AS'TER** (Lat., Gk. *ἀστήρ, astēr*, star). A genus of plants of the family Compositæ. The genus contains a great number of species, both herbaceous and shrubby, mostly natives of the United States. A number of perennial species are in cultivation as garden flowers. They bloom from July to November and are among the most valuable hardy plants for border and roadside planting. The ray and the disk are of different colors. The New England aster (*Aster novæ-angliæ*) is one of the most showy native American asters. The best known and most valued of all the asters is the China aster (*Aster chinensis*), a summer annual, of which more than 250 varieties are in cultivation, and new ones are continually being introduced. The plant was brought from China in the early part of the eighteenth century and has been greatly improved by cultivation. The different varieties exhibit diversity of form and color. The plant prospers in a rich, free soil. *Aster argophyllus*, or *Haxtonia argophylla*, a native of Van Diemen's Land, is a whitish shrub, smelling strongly of musk. A plant, known in the West as woody aster, *Xylorrhiza parryi*, is reported as very poisonous to sheep in Wyoming. For illustration, see ARAUCARIA.

**ASTER,** äs'tĕr, ERNST LUDWIG VON (1778–1855). A German military engineer. While an officer in the Saxon army, then an ally of the French, he submitted to Napoleon in 1811 a plan for the fortification of Torgau. Napoleon became much interested in it, and the fortress was finished under Aster's superintendence. After the Russian campaign, in which he took part, he served in the Russian army for some time and then returned to the Saxon service. In 1815 he became colonel in the Prussian army, and after the battle of Waterloo, in which he was engaged, he was promoted to be general and made inspector of Prussian fortifications. He planned the elaborate defenses of Coblenz and Ehrenbreitstein and was made commander of both fortresses. In 1827 he was promoted to be lieutenant-general, and in 1842, general of infantry. He left essays and other works posthumously published.

**ASTERABAD,** äs'tĕr-ȧ-bäd'. See ASTRABAD.

**ASTE'RIA.** See SAPPHIRE.

**AS'TERISK** (Gk. *ἀστερίσκος, asteriskos*, a little star). A sign or symbol (*) used in writing and printing as a reference either to a note at the bottom or on the margin of the page. The obelisk or dagger (†) and many other marks are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The asterisk and other similar signs may have any arbitrary meaning assigned to them, at the will of the writer, their signification being previously explained. The Greek grammarians, or critics, used the asterisk to mark a passage that had been unjustly suspected but was to be held as genuine, or a passage in any way remarkable; the obelisk, again, marked an interpolated or an objectionable word or passage. See TEXTUAL CRITICISM.

**ASTERN'.** See BEARING.

**AS'TEROIDS.** See PLANETOIDS.

**AS'TEROPH'YLLITES** (Gk. *ἀστήρ, astēr*, star + *φύλλον, phyllon*, leaf, alluding to the arrangement of the leaves). Fossil plant remains, formerly considered as representing a distinct genus, but now known to be, together with *Annularia* and *Sphenophyllum*, the heteromorphous leaves of the large group of *Calamites*,

of Devonian, Carboniferous, and Permian time. See CALAMITES.

**ASTHE'NIA** (Gk. *ἀσθένεια, astheneia*, loss of strength, from *ἀ, a*, priv. + *σθένος, sthenos*, strength). 1. In medicine, a condition of weakness, general or local, resulting from disease. General asthenia is a depression of the vital forces, attended by emaciation, such as occurs in advanced tuberculosis or long-continued fevers. 2. A specific infectious disease of chickens, due to *Bacillus* (*Bacterium*) *astheniæ*, a member of the colon group. Cultures of this germ are killed by immersion in a 1 per cent solution of carbolic acid for five minutes, though they can vegetate between the temperatures 40° and 55° C. (104° to 131° F.). The organism is killed at a temperature between 57° and 60° C. (134.6° to 140° F.). The most marked symptom of asthenia is extreme emaciation; the chief lesions are found in the duodenum; and in the contents of this part of the intestine the pathogenic organism occurs in large numbers. Thorough purgation followed by tonics has been recommended in the treatment of fowls suffering from asthenia. At present the disease is reported only in the United States and is popularly known as "going light."

**AS'THENO'PIA** (Gk. *ἀ, a*, priv. + *σθένος, sthenos*, strength + *ὄψ, ὄps*, eye), or WEAK SIGHT. A very common affection of the eye, caused by fatigue of the muscles moving the eyeball or of the ciliary muscle. It occurs most often in debilitated or neurasthenic persons, and its chief symptom is pain in or around the eyes, or headache, which is increased by use of the eyes, particularly upon near objects and in artificial light. If the strain is prolonged, the results may be temporary dimness of vision, sometimes double vision, confusion of the lines in reading, photophobia, irritability, itching and burning of the margins of the lids, and lachrymation. Disturbances of the stomach and of menstruation may also result. The affection may be muscular, accommodative, or nervous.

**Muscular Asthenopia.** This is caused by weakness of some of the muscles moving the eyeball, and often depends upon defects of sight. The symptoms result from the prolonged strain upon the weaker muscles in the effort to keep the visual axes of the eyes in the proper plane, in opposition to the action of stronger muscles.

**Accommodative Asthenopia.** This is due to strain and subsequent fatigue of the ciliary muscle which regulates the curvature of the crystalline lens. It occurs in various forms of defects of sight, such as astigmatism and hyperopia (see SIGHT, DEFECTS OF), and is due to the efforts of the ciliary muscle to alter the degree of curvature of the lens so as to bring rays of light entering the eye to a focus upon the retina.

**Nervous Asthenopia.** This is a functional disorder of the normal eye, depending upon hysteria, neurasthenia, or debility.

**ASTHMA**, ăs'mȧ *or* ăz'mȧ (Gk. *ἄσθμα*, short-drawn breath, panting, from *ἄειν, aein*, to blow). A disorder of the function of respiration characterized by acute attacks of difficult breathing accompanied by coughing, wheezing, and, in severe paroxysms, by slight asphyxia. Asthma most often develops after some slight catarrhal inflammation of the bronchial mucous membrane. Only the physician can diagnose asthma from an attack of shortness of breath. The theories of its causation have been numerous, but the one that best explains the symptoms is that asthma is due to spasm of the muscle fibres in the walls of the bronchi. In some cases it seems to be hereditary, and intensely nervous people seem to be more often affected. It occurs in men oftener than in women, and very frequently in children, especially after measles, bronchitis, or whooping cough. The attack may be set up by the inhalation of pollen, as in hay fever, by closure of the nostrils with polypi or other growths, causing intra-nasal pressure. In some people particular odors will bring on a paroxysm. An asthmatic attack usually begins suddenly, at night, with a preliminary sense of oppression. The patient wakes with much distress and anxiety, some pain in the chest, and great difficulty in breathing. The efforts to obtain air may necessitate great muscular exertion, and the patient may become covered with perspiration. The face may become purple and the eyes bloodshot. The attack may pass off and not reappear, but the disease is prone to be a chronic one. Treatment is mainly dietetic and hygienic, but many cases are cured by appropriate intra-nasal surgery. Dry inland climates are favorable. Bromides, iodides, nitrites, and opium, atropine, and adrenalin are the drugs most widely employed. Consult Osler, *Principles and Practice of Medicine* (New York, 1912).

**ASTI**, ăs'tē (anciently, *Asta Pompeia*). An episcopal city in the province of Alessandria, north Italy, on the left bank of the Tanaro, 35 miles southeast of Turin (Map: Italy, C 3). The walls are dilapidated, the streets narrow and irregular, and the general appearance mediæval. The cathedral dates from 1348, and the church of San Giovanni, built over an ancient Christian basilica, has monolithic columns bearing sixth-century symbols. Asti is famous for its sparkling wine (*Asti spumante*). It has trade in leather, woolen goods, hats, wine, and agricultural produce, and manufactures of silk. It excelled in the manufacture of pottery in ancient times. In the Middle Ages it was a powerful republic and famous for its 100 towers, of which 30 still remain. It was burned by the Emperor Frederick I in 1155, and after a series of vicissitudes came into the possession of the Visconti of Milan, by whom it was ceded to the French, who held it till the middle of the sixteenth century, when it passed into the possession of the dukes of Savoy. The poet Alfieri was born here in 1749. Pop., 1881 (commune), 32,233; 1901, 38,045; 1911, 41,252.

**ASTIE**, ȧs'tyȧ', JEAN FRÉDÉRIC (1822–94). A Protestant theologian. He was born at Nérac, France, and studied at Geneva, Halle, and Berlin. He was a clergyman in New York from 1848 to 1853, when he removed to Paris. In 1855 he settled at Lausanne, Switzerland, where, in the following year, he was appointed professor of philosophy and theology. The influence of Kant, Schleiermacher, and Vinet is revealed in his numerous writings on theology. In 1868 he became the editor of the *Revue de Théologie et de Philosophie*, which he conducted for many years. He published *Histoire de la république des Etats-Unis* (2 vols., 1865); *Mélanges de théologie et de philosophie* (1878).

**ASTIG'MATISM** (Gk. *ἀ, a*, priv. + *στίγμα, stigma*, prick of a pointed instrument; spot, mark). A defect in vision caused by the refraction of light by the eye differently in different planes. To an eye thus affected, a pinhole in a paper may appear round, but when the paper is moved a little, the circular hole will seem to be

an ellipse. Irregular astigmatism is that form in which there is a difference of refraction in various parts of the same meridian, as after injuries of the cornea or congenital defects in the lens. Regular astigmatism is that variety in which the degree of refraction of the two principal meridians differs. Astigmatism is usually due to differences in the curvature of the cornea: less frequently, of the lens. It is either simple, in which one meridian is normal and the other hyperopic; compound, in which both meridians are unequally hyperopic or myopic; or mixed, in which one is hyperopic and the other myopic. Astigmatism causes diminution of vision and asthenopia, with the usual manifestations of eye strain. Drowsiness, congestion of the conjunctiva, or blepharitis, may be the only symptoms; but severe headaches, neuralgias, ocular pains, and nausea are often present. In persons of a neurotic tendency especially, a wide range of reflex disturbances may accompany even a low degree of astigmatism. It is corrected by glasses ground as cylinders, sphero-cylinders, or a combination of a spherical and a cylindrical lens; or by crossed cylinders, which are a combination of two cylindrical lenses, with their axes at right angles to each other.

**ASTLE,** ăs'l, THOMAS (1735–1803). An English antiquary and paleographer. He wrote *The Origin and Progress of Writing* (1784; reprinted, 1876), an important contribution to English writings on the subject of paleography. He published also *An Account of the Seals of the Kings, Royal Boroughs, and Magnates of Scotland* (1792).

**ASTLEY,** HUGH JOHN DUKINFIELD (1856—). An English clergyman and anthropologist. Educated at Trinity College, Dublin, he was in 1881 ordained a clergyman in the Church of England. In 1894–96 he was incumbent of the parish of St. John the Evangelist, at Brixton, and from then on was vicar of East and West Rudham, Norfolk. He was Donellan lecturer at the University of Dublin (1906–07), honorary editorial secretary of the British Archæological Association (1897–1906), and librarian of the British Numismatic Society (1903–06). Becoming noted for his researches in archæology and anthropology, he was made a fellow of the Royal Historical Society and of the Royal Anthropological Institute, and a member of many other organizations. The degrees of M.A. and Litt.D were conferred upon him. His writings on theological, scientific, and social subjects include: *The Resurrection and Modern Thought* (1889); *The Date of the Samaritan Pentateuch* (1892); *The Higher Critics and Holy Writ* (1905); *Prehistoric Archæology and the Old Testament* (1908); *Portuguese Parallels to the Clydeside Discoveries* (1904); *The Saxon Church at Bradford-on-Avon* (1905); *Memorials of Old Norfolk* (1908); *The Housing Problem in the Country* (1901).

**ASTLEY,** ăst'lĭ, PHILIP (1742–1814). A noted English equestrian performer and manager. He was born at Newcastle-under-Lyne, and began work as a cabinetmaker, but enlisted as a cavalryman in the Seven Years' War, and after returning with an honorable discharge, gave exhibitions of horsemanship in Lambeth and elsewhere. At Lambeth he built, in 1770, a wooden circus, which grew, in course of prosperity and rebuilding after successive fires, into Astley's Royal Amphitheatre. This was the scene of a variety of exhibitions under his direction; but the special attraction was the equestrian performances, in which he himself excelled. He opened a similar establishment in Paris, which was seized for a barracks at the time of the Revolution, but he afterward recovered possession of his property. He died in Paris and was buried in Père-la-Chaise.

**ASTOLF.** See AISTULF.

**ASTOLFO.** An English noble in Charlemagne's train—a boastful but generous character. In Ariosto's *Orlando Furioso* he cures Orlando's madness by bringing back from the moon the great Paladin's wits in a vial. He is renowned for his fairy gifts of a magic horn, through whose notes all living things are panic-stricken, and a book which tells everything.

**ASTOLPHUS.** See AISTULF.

**AS'TON,** WILLIAM GEORGE (1841–1911). An Irish philologist and diplomat, born near Londonderry in 1841. He was educated (1859–63) at Queen's College, Belfast; one of his professors was Dr. James McCosh. He was appointed in 1864 student interpreter to the British Legation in Japan. He mastered the theory of the Japanese verb, and in Tokio began, with E. M. Satow, those profound researches into the Japanese language which laid the foundations of critical study in the Mikado's Empire. He held various offices in Japan until 1883; was made consul-general in Korea in 1884, and secretary of legation in Tokio in 1886. He retired on a pension in 1889. His publications include grammars of the Japanese language, spoken and written (1868 and 1872); a translation of the *Nihongi*, or *Annals of Ancient Japan* (1896), which show acute scholarship; *A History of Japanese Literature* (1899); and a great number of papers for learned societies on Korean and Japanese subjects, many of them in the *Transactions* of the Asiatic Society of Japan. In 1905 he published *Shinto*, a valuable study of primitive religion.

**ASTON HALL.** Supposedly the original of Irving's *Bracebridge Hall*. It was built of red brick in the Elizabethan style, by Sir Thomas Holte, in 1618–35. For some time before its purchase by the city of Birmingham in 1864, when it was turned into an art gallery and museum, it was in the possession of Charles Holt Bracebridge, of that city.

**ASTON MAN'OR.** A municipal borough in Warwickshire, England, adjoining Birmingham (q.v.), of which it is really a suburb, although it was separately incorporated in 1903 and returns one member to Parliament. The town is an industrial centre, its manufactures including beer, paper, and motor vehicles. A large athletic field in Aston is the scene of important football matches. Pop., 1891, 68,600; 1901, 77,300; 1911, 75,029.

**AS'TOR,** JOHN JACOB (1763–1848). An American merchant. He was born in Waldorf, a village near Heidelberg, Germany, the son of a butcher. He followed his elder brother, first to London and then to New York, whither he went in 1783. He soon invested his small capital in furs, and by economy and industry he so increased his means that after six years he had acquired a fortune of $200,000. He traded directly with the Indians, peddling gewgaws among them and buying their furs at a ridiculously low rate. At first he prepared the furs with his own hands and took them to the London market. He also became the New York agent of his brother's

house, which dealt in musical instruments. Although the increasing influence of the English fur companies in North America was unfavorable to his plans, he ventured to fit out two expeditions to the Oregon Territory—one by land and one by sea—the purpose of which was to open up regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria was established; but the War of 1812 stopped its prosperity for a time. From this period Astor's commercial connections extended over the entire globe, and his ships were found in every sea. He was especially successful in the China trade. He left property amounting to $30,000,000, largely invested in real estate, which has since enormously increased in value. The Astor House, on lower Broadway, New York, was built by him. He left a legacy of $350,000 for the establishment of a public library in New York. (Consult Washington Irving's *Astoria* (Philadelphia, 1836) and James Parton's *Life of John Jacob Astor*, 1865.) His wealth was mainly inherited by his son, WILLIAM BACKHOUSE, who continued to augment it till his death in 1875, when it had increased to about $50,000,000. During his lifetime he made many gifts to the Astor Library, and at his death left it $250,000 and books worth $200,000. He was known as the "Landlord of New York," from the extent of his property in that city.

**ASTOR,** JOHN JACOB (1864–1912). An American capitalist, inventor, and soldier; the fourth of the name. He was born at Rhinebeck-on-Hudson, N. Y., graduated in 1888 at Harvard, traveled extensively, and afterward was occupied chiefly with the management of the Astor estate. The St. Regis and Knickerbocker hotels, and the Astoria (later part of the Waldorf-Astoria) in New York were built by him. In 1894–96 he was on the staff of Gov. L. P. Morton, and in 1898 was commissioned lieutenant-colonel of United States Volunteers. During the Spanish-American War he served as a staff officer in the Santiago campaign and presented to the government a fully equipped mountain battery, which was named for him, and which did effective work in the campaign before Manila. He became known as an inventor of several useful devices, such as a bicycle brake, a pneumatic road improver, improved marine turbines, a machine for the utilization of peat deposits, etc. He was director of many financial organizations and railroads, and was one of the founders of the New Theatre. Colonel Astor published *A Journey in Other Worlds* (1890) and *A Romance of the Future* (1894). He was drowned at sea when the *Titanic* sank.

**ASTOR,** WILLIAM WALDORF (1848–1919). The great-grandson of John Jacob Astor. He was born in New York City, and studied law in order to qualify himself for assuming the management of the Astor estate. He was elected to the New York State Assembly in 1877 and to the Senate in 1879. In 1881 he was defeated by Roswell P. Flower as a candidate for Congress. He was appointed by President Arthur Minister to Italy in 1882, a post which he held till March 1, 1885. As a result of studies made at Rome, he published two romances: *Valentino* (1886) and *Sforza* (1889). On the death of his father he became the head of the family and the inheritor of the estate, estimated at $200,000,000, largely invested in real estate. He built three magnificent hotels in New York City, the Netherland, the Waldorf, and the Astor. In 1890 he went to London to live and in 1899 became a British subject. He bought the *Pall Mall Gazette* in 1893 and founded the *Pall Mall Magazine*.

**ASTORGA,** ȧs-tōr'gȧ (anciently, Lat. *Asturica*). A town of Spain near the river Tuerto in the province of Leon, still surrounded by massive Roman fortifications (Map: Spain, B 1). It was the ancient Asturica Augusta, a Roman provincial capital where four military roads met. In the neighborhood is a ruined castle which was a famous centre of Spanish resistance to Moorish onslaughts in the eighth century. The town was once known as the "City of Priests." It has been the see of a bishop since the third century, and its bishop is suffragan to the Archbishop of Valladolid. Pop., 1910, 5682.

**ASTORGA,** EMANUELE BARON D' (1680–c. 1750). An Italian composer. Born at Augusta, Sicily, the son of a Spanish nobleman, he later became widely known as a composer After travels through Europe he lived in Spain, but Rochlitz's (1825) romantic story of his life is pure fiction. His best-known work is his *Stabat Mater*, (London, 1752). He also wrote numerous chamber-cantatas and an opera, *Dafni* (Genoa, 1709). Consult H. Volkmann, *Emmanuel d' Astorga* (Leipzig 1911).

**ASTO'RIA.** A city, port of entry, and the county-seat of Clatsop Co., Oreg., 100 miles northwest of Portland, on the south bank of the Columbia River (Map: Oregon, B 1). It is on the Spokane, Portland, and Seattle Railroad, and has several steamship lines to domestic and foreign ports. There are now about 5 miles of water front within the city limits. Astoria is the centre of an extensive salmon-fishing and canning industry, one of the most important in the world, and contains iron works, can factories, lumber mills, and other industrial establishments. It controls, also, a large export trade in lumber, wheat, flour, etc. The United States custom house and post office, Astor Park, the public library, and St. Mary's Hospital (Roman Catholic) are among the more important features of the city. Here is located Fort Clatsop, established in 1805 by the Lewis and Clark Expedition. Astoria, founded as a fur-trading station in 1811 by John Jacob Astor, was the first settlement in the valley of the Columbia. In 1813 the English took possession, renamed it Fort St. George, and held it until 1818, though until 1845 the Northwest Company, English fur-traders, continued to occupy it. In 1876 it was chartered as a city. The water works are owned by the municipality. Pop., 1890, 6184; 1900, 8381; 1910, 9599; 1920, 14,027. Consult Washington Irving, *Astoria; or, Anecdotes of an Enterprise beyond the Rocky Mountains* (Philadelphia, 1836).

**ASTORIA.** An account of Astoria, the settlement founded by John Jacob Astor on the Columbia River, by Washington Irving (1836).

**AS'TOR LI'BRARY.** See NEW YORK PUBLIC LIBRARY.

**ASTOR PLACE RI'OT, THE.** In American history, a riot which occurred in Astor Place, New York City, on the evening of May 10, 1849, and which grew out of an attempt by partisans of the American actor Edwin Forrest, assisted by the rabid anti-English element of the lower classes in the city, to prevent the English actor William C. Macready from giving a performance of *Macbeth* in the Astor Place Opera House. A disorderly crowd assembled in

Astor Place early in the evening, and soon after the performance began, fiercely attacked the opera house and endeavored to force their way inside. The police proving unable to disperse the mob, the Seventh Regiment was called out; and before order could be restored, 34 of the rioters had been killed and many more wounded, while 141 of the militiamen had been more or less seriously injured by brickbats and stones. After the performance Macready was taken to a private house, and two days later proceeded secretly to Boston, where he took ship for England. Consult Wilson, *Memorial History of New York*, vol. iii (4 vols., New York, 1892–93), and Barrett, *Edwin Forrest* (Boston, 1882).

**ASTRABAD,** ăs'trȧ-băd', or **ASTERABAD** (*Aster*, name of a river + Pers. *abad*, dwelling, town). A town of Persia; capital of the province of Astrabad, situated in about lat. 37° N., and long. 54° 30′ E., about 20 miles from Astrabad Bay (Caspian Sea) (Map: Persia, E 3). It is surrounded by a ditch and a mud wall, and its streets and houses, once substantially built and well kept, are now little better than ruins. Astrabad contains an extensive bazaar, several fine mosques, and the remains of a palace built by Shah Abbas. It was long the residence of the Rajah princes, who are related to the present ruling house of Persia, and a number of whom are still living at Astrabad. The trade with Russia, which country has a naval station and a fort on the island of Ashurada in Astrabad Bay, has increased steadily. The chief articles of export are cotton, rice, silk, grain, carpets, salt, and caviar. The port of Astrabad is Gez, a little village with a population of about 1200. Astrabad is connected by a caravan route with Afghanistan, and is the seat of a Russian consulate. The city is in an unhealthful region and is known colloquially as the "City of the Plague." It was swept by a disastrous fire in 1808. The population is variously estimated from 10,000 to 30,000.

**ASTRÆ'A** (Gk. *'Αστραία, Astraia*). The "Star Maiden," who, according to Greek stories reflected by Ovid in his *Metamorphoses*, dwelt among men during the Golden Age, but left the earth in the Iron Age, in grief at the wickedness of mortals, and returned to the gods. She was the last of the gods to quit the earth. Some writers made her a daughter of Zeus; others called her the daughter of the Titan Astræus and Eos, and identified her with Dike. On her return to heaven she became the constellation Virgo. Astræa is also the name of one of the planetoids.

**ASTRÆA,** THE DIVINE. Mrs. Aphra Behn, "the first Englishwoman to live by her pen." A vivacious and ingenious, though somewhat coarse, dramatist and novelist of the eighteenth century. Author of *Oroonoko*, the story of a "royal slave." Mrs. Behn and William Congreve were the first to oppose the vogue of heroic French romances, which were translated and imitated in England during the latter part of the seventeenth century.

**ASTRÆA RE'DUX** (Lat. Astræa brought back). A poem written by Dryden, commemorating the return of Charles II. It was published in 1660, only two years after the appearance of the same poet's obituary eulogy of Cromwell, "Heroic Stanzas." Admirers find in the later poem a line which they think explains the apparent contradiction in the poet's sympathies. According to them, the line, "To stanch the blood by breathing of the vein," means that Cromwell was justified in the execution of Charles II's father, but that Charles II's speedy succession to Cromwell was equally advantageous for England.

**AS'TRAGAL** (Lat. *astragalus*, from Gk. *ἀστράγαλος, astragalos*, the ball of the ankle joint). In architecture, a rounded bead molding, either plain or divided into rounded sections; used especially to designate the small molding at the top of the shaft of a classic column, corresponding to the cincture at the bottom. Also, the molded strip applied to the meeting stiles of folding doors.

**ASTRAG'ALUS** (Lat., Gk. *ἀστράγαλος, astragalos*). A bone of the foot, which forms, with the leg bones, the hinge of the ankle joint. Its lower surface is concave, and rests on the *os calcis*, or heel bone, to which it is attached by a strong ligament. In front it has a round head, which rests in the concavity of the scaphoid, another bone of the tarsus, and upon an elastic ligament, its pressure upon which gives in a great measure the necessary elasticity to the foot. It is at this joint that inversion and eversion of the foot take place. The astragalus is a bone of great importance, as it supports the weight of the body in standing and enters into most of the movements of the foot.

**ASTRAGALUS.** A genus of shrubby or herbaceous plants belonging to the family Leguminosæ and embracing about 1000 species. They are found in almost all parts of the world except Australia. The leaves are pinnate and the pods more or less two-celled. They are commonly met with on dry soils. A number of species, among them *Astragalus gummifer* and *Astragalus microcephalus*, yield gum tragacanth. In the western United States many species abound, and poisonous properties are attributed to some, which are called "loco weeds." *Astragalus mollissimus* and *Aragallus lamberti* are very common "loco weeds," and horses or cattle eating them are said to lose appetite for anything else, become deranged, and finally die. If taken from pastures where these weeds abound and well fed, stock usually recover. The administering of Fowler's solution to horses and small doses of strychnine to cattle have proved valuable treatments. They should be given only under advice of a veterinarian, as locoed animals are very susceptible to the bad effects of overdosing. See GUMS.

**ASTRAKHAN,** ăs'trȧ-kăn', or *Russian pron.* ŭs'trȧ-kän'y'. A government in southeastern Russia; previous to 1554 a province of the Mongol Empire. It borders on the Caspian Sea (Map: Russia, J 5) and is the fourth government of Russia in order of size, having an area of 91,042 square miles, exclusive of inner waters. The capital is Astrakhan. The surface is almost entirely a barren waste, the only fertile portions being the banks of the Volga, which divides the province into two equal parts, the steppes of the Kalmuks on its right and of the Kirghiz on its left. The principal industry of the population is herring and sturgeon fishing, in which are also engaged about 30,000 persons from the adjacent governments. The annual catch of herring ranges from 21,000,000 in bad years to 78,000,000 in good. An auxiliary to this industry is the extraction of salt from the lakes and from the marshes of the steppes, to the amount of about 300,000 tons annually. Another industry of importance is

cattle breeding, the only means of subsistence of the Kalmuks, Kirghiz, and a considerable portion of the Tatars. Agriculture is undeveloped. The population, numbering 879,000 in 1892, 1,230,300 in 1909, and 1,262,000 in 1911, is composed of diverse elements—Russian, Tatar, Georgian, Armenian, Bokharese; the semi-nomadic Kalmuk (Buddhist) and Kirghiz (Mohammedan) tribes number over 300,000. There are also some Persians and Hindus.

**ASTRAKHAN** (named after the Khan *Aster*). The capital of the government of the same name in Russia, situated on an island of the Volga, 60 miles from the Caspian Sea and 933 miles southeast of Moscow (Map: Russia, G 5). It is the seat of a Greek and an Armenian archbishop; has Greek, Roman Catholic, Protestant, and Armenian churches, many mosques, an Indian temple, several museums, botanical gardens, technical schools, and a seminary for priests. The town is situated on very low ground, the average elevation reaching but 8½ feet above the level of the Volga, and its highest point not exceeding 46½ feet. It is irregularly built; the streets are filthy, since they are neither paved nor ever sprinkled or swept. There is no modern sewerage system, and cesspools contaminate the air. The low situation of the town has made it necessary to surround it by a wall of earth rising about 14 feet above the ordinary water level of the Volga; all of which gives the place rather an Oriental appearance. The position of the town on the Volga, the greatest river in Europe, its proximity to the Caspian Sea, an advantage which has been further enhanced by the construction of the Trans-Caspian Railway, and the development of petroleum deposits in the vicinity of Baku, have made Astrakhan one of the most important commercial centres of Russia and the entrepôt for goods exchanged between Russia and western Europe on the one hand, and Persia, Bokhara, Khiva, and other Middle Asiatic countries on the other. The chief articles of import from the East are gold, embroidered silken goods, silk stuffs, woolen goods, raw silk, grain, timber, rhubarb, and drugs. The exports include cotton, fish, petroleum and petroleum products, linen, leather, paper, dry goods, glass, paints, salt, and sugar. The annual value of the imports and exports is about 68,000,000 rubles (about $34,000,000). The industries show little progress and include chiefly the manufacture of silk goods, leather, machinery, tar, paper, and brick. There are over 70 docks, accommodating more than 4000 ships annually. The fisheries in the Volga employ a great number of the inhabitants, and the vine is cultivated in the environs. The town gives its name to a fine quality of fur, the product of a variety of sheep found in Bokhara, Persia, and Syria. There are many charitable institutions and hospitals. Pop., 1897, 113,000; 1908, 136,841; 1912, 149,630. Astrakhan was important during the Middle Ages. For several centuries it was in the hands of the Tatars and did not come into undisputed possession of Russia until 1554.

**ASTRAL BODY.** See THEOSOPHY.

**AS'TRAL SPIR'ITS.** In ancient Oriental and Greek religious systems, the spirits which animated and controlled the heavenly bodies (Gk. *ἄστρα, astra*). When these notions, possibly handed down by the Gnostics, passed into the demonology of the Middle Ages, the astral spirits were sometimes adapted into fallen angels—the transition being easy from the general belief that angels personally directed all physical manifestations, such as thunder-storms; sometimes they were conceived of as the souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell, without belonging to any one of these provinces. Paracelsus and others attributed to every human being an astral spirit or sidereal element in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies.

**ASTRÉE**, ȧs'trȧ'. A novel. See URFÉ.

**ASTRIN'GENTS** (Lat. *ad*, to + *stringere*, to bind fast, tight). Medicines which cause contraction of tissues, and thus prevent excessive discharges of blood, mucus, and other secretions. They are used to arrest diarrhœa, hemorrhage, and discharges from mucous membranes. They act locally, although gallic acid is thought to act as a remote astringent, tending to check hemorrhage in any part of the body when given by mouth. Astringents are of two classes, vegetable and mineral. The most important of the first class are: tannic and gallic acids (derived from nut-gall), rhatany, catechu, kino, logwood and white-oak bark. Mineral astringents include nitrate of silver, the sulphates of copper, zinc, and iron, chloride of iron, acetate of lead, alum, sulphuric, nitric, and hydrochloric acids.

**AS'TROCAR'YUM** (Gk. *ἄστρον, astron*, star + *κάρυον, karyon*, nut; referring to the arrangement of the fruits). A genus of palms, of which about 30 species are known, natives of tropical America, remarkable for the abundance of acute and formidable spines, in some cases a foot long, with which almost every part—stem, leaves, spathe, and fruit-stalk—is armed. They have beautiful pinnate leaves; some of them are lofty, others are of very moderate height, as 8 to 15 feet, while some are almost or altogether stemless, as *Astrocaryum acaule*, the Iu palm. The fruit of some species is eatable—a juicy pulp covering a stony seed—as the fruit of the Murumurú palm (*Astrocaryum murumurú*), the pulp of which is said to resemble a melon in flavor, has a sort of musky odor, and is highly esteemed. It is a palm only about 8 to 12 feet high, abundant about Pará and elsewhere on the Amazon. Cattle roam the forests in quest of its fruit, and swine fatten on the seed, which they crush with their teeth, although in hardness it almost resembles vegetable ivory. Another edible fruit is that of the Tucumá palm (*Astrocaryum tucuma*), abundant in the same regions. These fruits are about an inch long, the Murumurú ovate, the Tucumá almost globular. The Tucumá palm is 30 to 40 feet high, the stem encircled with narrow rings of black spines, which are disposed with beautiful regularity. The Tucum palm (*Astrocaryum vulgare*), a species quite distinct from the Tucumá, and more lofty, is of great importance to the Indians, and in places where it is not indigenous is cultivated with care for the sake of the epidermis of its unopened leaves, of which they make cordage, very useful for bowstrings, fishing nets, etc. The fibre is at once fine, strong, and durable, and may yet perhaps become important as an article of commerce. Beautiful hammocks are made of Tucum thread. The fibre is obtained by cutting down the terminal bud or column of unopened leaves which rises from the centre of the crown of foliage. The tender

leaflets are then carefully stripped of their epidermis, in pale, ribbon-like pellicles, which shrivel up almost to a thread. These are tied in bundles and dried, and are afterward twisted into thread, or made into thicker cords, by mere rolling and manipulation. The mature leaves yield a coarser fibre, which varies considerably with the different species. It is used for cordage, and the split stems of the new leaves are braided into hats and baskets.

**ASTROGRAPHIC CONGRESS.** See ASTRO-PHOTOGRAPHY.

**AS'TROLABE** (Gk. *ἀστρολάβον, astrolabon*, star-taker). The name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the armillary sphere, were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sights for taking altitudes, was known as an astrolabe in the palmy days of astrology, and was the badge of the astrologer. The astrolabe has been superseded by the more perfect instruments of modern astronomy.

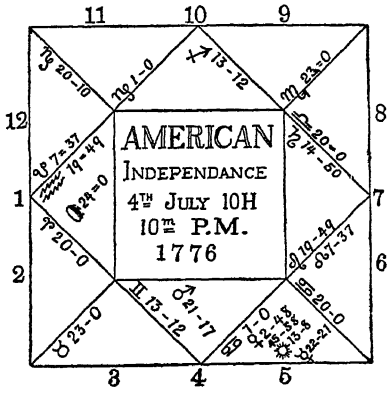
**ASTROLABE, THE, or THE CONCLUSIONS OF.** A fragmentary prose treatise by Chaucer, written in 1391 or shortly after, for the instruction of his son Lewis. It is an English rendering, from a Latin copy, of a work by the Arabian astronomer, Messahala.

**ASTROL'OGY** (Gk. *ἄστρον, astron*, star + *λόγος, logos*, science). The term meant originally much the same as *astronomy*, "the knowledge of the stars," but was at length restricted to the science of predicting future events, especially the fortunes of men, from the positions of the heavenly bodies. This was considered the higher, the real science; while the mere knowledge of the stars themselves, their places and motions (astronomy), was, till a very recent period, cultivated mostly with a view to (judicial) astrology. Astrology is one of the most ancient forms of superstition, and is found prevailing among the nations of the East (Egyptians, Chaldæans, Hindus, Chinese) at the very dawn of history. The Jews became much addicted to it after the Captivity. It spread into the West and to Rome about the beginning of the Christian Era. Astrologers played an important part at Rome, where they were called Chaldæans and "mathematicians"; and though often banished by the Senate and emperors under pain of death, and otherwise persecuted, they continued to hold their ground. The Roman poet, Manilius, author of an astronomical poem still extant, was addicted to astrology; and even Ptolemy, the astronomer, did not escape the infection, which in his time had become universal. It accords well with the predestinarian doctrines of Mohammedanism, and was therefore cultivated with great ardor by the Arabs from the seventh to the thirteenth century. Some of the early Christian Fathers argued against the doctrines of the earlier astrology, while others received them in a modified form; and indeed it formed part of the basis of their religion in the Gospel narrative of the visit to Bethlehem of the Wise Men from the East, who were Chaldæan magi or astrologers. In its public capacity the Church several times condemned the study as tending to fatalism, superstition, and unlawful prying into the future; but many zealous Catholics—even churchmen—have cultivated it. The fourteenth and fifteenth centuries were the palmy days of the science; chairs for its teaching were founded in the two oldest universities—those of Bologna and Padua—and no prince's court was complete without its official astrologer. After the Renaissance the study was vigorously opposed from diametrically opposite points of view—such as those of Savonarola and Pico della Mirandola. But for centuries the most learned men still remained devoted to its teachings, including among astronomers Cardan, Tycho Brahe, and Kepler; Wallenstein absolutely, and Napoleon partly, believed in it, though the frequent references of the latter to his "star" seem to have been made largely for effect. Bacon maintained the reality of an underlying basis of truth at least, while discrediting the practitioners of his day. Burton and Sir Thomas Browne also retained a belief in its possibilities. William Lilly was the last astrologer in England who had any great public influence; he asserted and partly proved his wonderful success in foretelling both public and private events. But the acceptance of the Copernican system and new fashions in science tended to destroy the older beliefs; and by the following century the study had so far lost its hold that the merciless ridicule of Swift, applied to the unfortunate almanac-maker Partridge, was sufficient to discredit it. But believers in it are still found, even among educated men. In Germany J. M. Pfaff published a notable treatise in its favor entitled *Astrologie* (Bamberg, 1816). The natural tendency of the ignorant and credulous to seek for insight into the future has allowed a multitude of quacks to trade upon the name of astrology and to give the impression that it is beneath contempt. It is well to point out, however, that the predictions of the better class of astrologers are not mere haphazard guesses, as is frequently supposed, but are based upon rigidly scientific determination from observed phenomena, according to definite rules of interpretation; and also that astrology lays no claim to absolute prediction of future events, undertaking merely to point out the direction which affairs are likely to take, other things being equal—according to the old saying: *"Astra regunt homines; sed regit astra Deus."*

The ordinary method of applying judicial, or, as it is sometimes called, mundane, astrology to the decision of a question was to calculate the moment when the question was asked or at the birth of the "querent." Then the circle of the heavens was divided into twelve equal parts, six above and six below the horizon. These are the twelve "houses," through which the planets pass in their regular movements. The first house, that which lay in the east from 5° above the horizon to 25° below, called the ascendant, was considered of the most importance, as it contained that part of the heavens which was about to rise. The planet which was "lord" of this house was usually taken as the "significator" of the "querent." Each house, however, had one of the heavenly bodies as its lord, who was considered to be strongest in his own house. The first was called the house of life; the second, that of fortune or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends and benefactors; the twelfth, of enemies or of captivity. Besides the positions of the planets in the different houses, it was necessary to consider their position in relation to

each other—in conjunction, in opposition, and so on through a variety of technical descriptions. Each planet was supposed to rule some special part of the world and of the human body, so that according to its position it might bring on certain conditions for the countries under its influence and cause or avert certain diseases. Persons born under particular planets were believed to be endowed with temperamental characteristics corresponding to the nature of the planet. From this belief the epithets *mercurial, jovial, saturnine* have passed into common speech; in fact, a larger number of expressions than would be generally supposed come from astrology. *Disastrous* and its Saxon equivalent *ill-starred, ascendancy, consider,* are examples of words which are relics of this once universal belief; and many passages in our older writers are unintelligible without some knowledge of it.

The accompanying figure shows the positions of the planets at the time of the signing of the




Declaration of Independence. According to astrological interpretation, the newly formed nation was destined to enjoy success in war and to develop an extensive commerce with every country of the earth, while fecundity and prosperity were to reign among its people.

Consult: Sibley, *A New and Complete Illustration of the Celestial Science of Astrology* (London, 1789); Maury, *La magie et l'astrologie à l'antiquité et au moyen âge* (4th ed., Paris, 1877); Meyer, *Handbuch der Astrologie* (Berlin, 1891); Butler, *Solar Biology* (5th ed., Applegate, Cal., 1892); Bennett, *Astrology* (New York, 1894); Fomalhaut, *Manuel d'astrologie sphérique et judiciaire* (Paris, 1897); Merton, *Heliocentric Astrology* (Philadelphia, 1910); Cumont, *Astrology and Religion among the Greeks and Romans* (New York, 1912); Jastrow, *Hepatoscopy and Astrology in Babylonia and Assyria* (Philadelphia, 1908); Wilde, *Chaldean Astrology* (London, 1912).

**AS'TRONOM'ICAL AND AS'TROPHYS'ICAL SOCI'ETY OF AMER'ICA.** A national organization with membership limited to persons possessing technical attainments in astronomical and astrophysical science. The society was founded in 1899. It has about 235 members.

**ASTRONOMY** (Gk. *ἀστρον, astron,* a star + *νόμος, nomos,* law). The science which deals with the celestial bodies. These comprise all the various bodies distributed throughout the universe, such as the earth (considered as a whole) and the moon, the sun, the planets and their satellites, the planetoids or minor planets, the comets and meteors, the fixed stars, and the nebulæ. Of these, all but the fixed stars and the nebulæ, which are immeasurably remote, belong to the solar system.

In the eyes of the ancients certain celestial bodies, seven in number, early assumed an importance from the fact that they changed their positions relatively to the stars and quite independently of the diurnal motion of the heavens. For this reason they were called planets, or "wanderers." They were believed to revolve round the earth, which was regarded as fixed in space and was thought to be the centre of the universe. The two brightest, and apparently the largest, of these wandering bodies were the sun and the moon, the rest, much less bright than these and apparently of diminutive size, but still distinguished by their brilliancy in comparison with all but a few of the stars, came to be known by the names Mercury, Venus, Mars, Jupiter, and Saturn. We now know that the ideas of the ancients regarding the constitution of the universe were erroneous; that, in fact, it is the earth which revolves round the sun, and not vice versa, and that its path or orbit is an ellipse, while the moon moves round the earth in a similar orbit and is carried along with the earth in its annual journey round the sun. We know, moreover, that the five remaining bodies, like the earth, travel in ellipses round the sun. This aggregation of celestial bodies constituted the solar system as known at the beginning of the seventeenth century. The telescope has since added to the sun's family two other planets, Uranus and Neptune, revolving far beyond the orbit of Saturn, and an ever-increasing number of small planetary bodies, known as minor planets or planetoids, lying between Mars and Jupiter, and has further disclosed the fact that all of the major planets with the exception of Venus and Mercury have attendant moons, or satellites, which vary in number from one in the case of Neptune to 10 in that of Saturn. When we come to consider the distances of the planets from the sun, we find that they are approximately connected by a remarkable empirical law, known as Bode's Law (q.v.). The distance of the earth from the sun is, roughly, 92,500,000 miles. Between the earth and the sun revolve the two so-called "inferior" planets, Mercury and Venus, while the remaining planets, known as the superior planets, lie outside the earth's orbit, Neptune, the outermost, revolving round the sun at the enormous distance of nearly 3,000,000,000 miles. In addition to the planets, the solar system also contains certain somewhat erratic bodies called comets. Nothing definite is known as to their origin; but it is certain that they move, under the influence of gravitation, in orbits that admit of calculation. In appearance comets vary greatly. At times they are so tenuous that they can barely be glimpsed in the telescope and allow the stars to be seen easily through them on the background of the sky. At other times they form magnificent objects, very conspicuous to the naked eye, and often possess tails which extend over a large part of the celestial vault. There is good reason to suppose that comets occasionally become completely disintegrated, subsequently changing into swarms of small particles. When the earth passes through such a swarm, friction with our atmosphere heats the particles until they become incandescent. They are then plainly visible as meteors,

and even quite large ones have at times been found actually to fall upon the earth's surface.

From a terrestrial point of view, being the source of our light and heat, the sun is certainly the most important of all the heavenly bodies. But considered as a cosmic body the sun is simply a blazing star, and not even a very great one as compared with the average of all the stars. One of the most interesting questions in connection with the sun is the probable source of its great and continuing heat. Why does it not become completely consumed as a result of continuous combustion? This question was answered by Helmholtz, who showed that the energy required to generate the sun's heat could be derived from a gradual contraction or shrinkage of its bulk. So great is this bulk that a contraction sufficient to produce the heat in question might go on for 10,000 years without producing a diminution in the sun's apparent diameter large enough to be perceived even by our greatest telescopes.

Far beyond the confines of the solar system, and, indeed, at a distance almost inconceivably great, is situated the universe of stars. According to the accepted theory these stars, which to us appear merely as points of light, are really great blazing suns, in many cases, doubtless, attended by systems of planets analogous to our own. The stars are usually called "fixed stars." It is known, however, that they are not really immovable, but are in continuous motion through space in orbits so vast that we have as yet been unable to do more than guess at their dimensions. Even the sun, regarded as a star, is known to be moving through space toward a point in the constellation Lyra with a velocity of about 12 miles per second. The whole solar system of course partakes of this motion.

Many attempts have been made to measure the distances of the stars. But as we can actually observe only their directions in space, the sole method open to us is to note whether such directions suffer any change when the earth is situated at opposite sides of its orbit around the sun. So great, however, are the stellar distances that no star has yet been found for which this change of direction is greater than about one second of arc. (See PARALLAX.) With reference to their brilliancy, the stars have been classified in groups, and the term "magnitude" has been used to designate brilliancy. Thus by a star of the first magnitude is meant one whose light is so brilliant as to place it among, say, the 20 brightest stars. Of course, the number of stars of each magnitude increases very rapidly as we come to the classes of lower brilliancy. Strangely enough, the magnitudes of the stars are not constant. There is, for instance, one star in the constellation Argo that has diminished so much in brightness that it is at present no longer visible to the naked eye, though about the middle of the past century it was at least the equal of any star in the sky. To this class of variable stars belong also the "temporary stars," which blaze up now and then like a great conflagration, only again to subside into invisibility after a short time.

Frequently we find a couple of stars very close together on the sky. Indeed, often they are so near that the eye fails to distinguish them, and it requires a powerful telescope to separate their light. It was thought at first that these double stars were accidental merely, and that while the two stars had nearly the same direction in space, they might nevertheless be separated by an immense linear distance. But it has been found that many double stars are true *binaries*, showing an orbital revolution about the common centre of gravity of the two component stars. Sometimes such stellar systems have three or more components. Even entire clusters may have a physical connection within themselves, and it is not improbable that the forces of gravitational attraction compel and control the complex movements of such aggregations of stars, just as they do the lesser intricacies of our own solar system. A magnificent field for speculation is opened by a consideration of the vast possibilities of such mighty stellar groups—true universes within the universe.

In addition to the stellar systems, we have in the sky another interesting class of objects, the nebulæ. These appear in the telescope as hazy clouds of light, usually condensing here and there into brighter nuclei. It is impossible to escape the conviction that these nebulæ are gaseous, and that they furnish a sort of key to the life history of the ordinary stars. Indeed, spectroscopic evidence tends to show that many of the nebulæ are composed of matter in the form of incandescent gas. What, then, can be more plausible than to see in the stars the result of a gradual process of cooling in nebulous matter? One can imagine readily that condensation and contraction might result in the formation of a single central sun, or that there might be two or more such centres. Indeed, the sky actually does show some cases of "double nebulæ." Mathematical research has indicated that the tidal effects seen on a small scale in the case of the earth and moon would play a much more important part in double nebulæ while still in the plastic condition. The mighty cosmic tides that would there be set up might undoubtedly produce perturbations great enough to account for the most complete changes in the character of motion within the system. An account of this study of the past and future history of cosmic systems may be found in the article COSMOGONY.

The whole subject of astronomy is so extensive that it is convenient to consider it from several different standpoints. What is termed Practical Astronomy, for example, treats of the manipulation of astronomical instruments and is concerned with the observing and recording of the positions and motions of the heavenly bodies and with the determination of their distances and dimensions. Theoretical Astronomy, on the other hand, deals with the computation of orbits, and with the prediction of the positions of the heavenly bodies at any subsequent time; it includes also the application of spherical trigonometry to astronomy, which regards these bodies simply as points on the surface of the celestial sphere. In Gravitational Astronomy, or Celestial Mechanics, we have the application of the principles of dynamics to account for the motions of the celestial bodies. One of the most important developments of astronomy is found in what is known as Physical Astronomy, or Astrophysics, which deals with the determination of the physical and chemical characteristics of the celestial bodies. The study of the physics and chemistry of the heavenly bodies originated during the nineteenth century and has already resulted in the development of astronomy along lines scarcely deemed possible by the older astronomers; and it is along these lines that our

knowledge of the heavens seems destined to progress most rapidly. No hard and fast lines can be drawn separating these divisions of astronomy, which overlap to a greater or less degree. Moreover, each has many subdivisions which are frequently so extended in their range as to rank almost as divisions of the first order; thus, solar physics has now attained a position of such importance that observatories have been established with the sole object of the prosecution of that branch of astrophysics. Theoretical Astronomy and Celestial Mechanics are largely mathematical in their treatment.

Astronomy is the oldest of the sciences. Its early history is perhaps more important than that of any other science; indeed, it may be said that a study of the state of scientific culture among the early peoples amounts to little more than an examination of their notions on astronomy. The science had its beginning with the Chaldæans and Chinese, working, of course, independently of each other. The former, according to Greek historians, were able to predict eclipses with considerable accuracy; they were also acquainted with the year of 365¼ days, and we owe to them the invention of the sun-dial and the clepsydra for the purpose of measuring time. The Chinese, on the other hand, were acquainted with certain elementary forms of the calendar and have left authentic observations of eclipses, comets, etc., extending back at least 1000 years before our era; their most notable achievement seems to have been a determination of the obliquity of the ecliptic about 1100 B.C. confirming the secular diminution of that constant. Other early peoples who cultivated astronomy were the Hindus and the Egyptians, but their observations were connected mainly with religious ritual.

It was to the Greeks, more than all other peoples of antiquity, that the rise of astronomy to the position of an exact science was due. Among them we find various names conspicuous at a very early date. Thales of Miletus (c.640–546 B.C.), who is generally called the Founder of Greek Astronomy, taught that the stars shone by their own light, but that the light of the moon was derived from the sun; he also held that the earth is a sphere. Among his successors, Anaximander, Anaxagoras, Democritus of Abdera, Pythagoras (c.580–497 B.C.), Meton, Eudoxus of Cnidus, and Aristotle are all mentioned by later writers as distinguished astronomers. It is true that some of these occupied themselves principally with imaginary systems of the universe based upon abstract speculation rather than accurate observation, but others made real contributions to knowledge. Thus, to Pythagoras we owe the first suggestion that the earth revolves round the sun; to Meton, the introduction of the Metonic cycle of 19 years which displaced the old Chaldæan Saros as a means of calculating the recurrence of eclipses; and to Eudoxus, the first attempt to express the motions of the planets with the aid of geometry. About the end of the third century B.C. a noted school of astronomers grew up at Alexandria under the patronage of the Ptolemaic dynasty, and the development of astronomy received a fresh impulse. Aristyllus and Timocharis, who flourished under Ptolemy Soter, the first of the dynasty and the founder of the famous Alexandrian library, left observations of the relative positions of the stars in the zodiac which later led to the discovery of the precession of the equinoxes by Hipparchus. Aristarchus of Samos (c.275 B.C.) calculated the distances and magnitudes of the sun and moon, and Eratosthenes (c.275–195 B.C.) determined the obliquity of the ecliptic by means of the armillary sphere which he invented. The latter held that the earth was a sphere, and, by measuring an arc of the meridian between Alexandria and Syene, deduced from it the first estimate of the earth's circumference, viz., 250,000 stadia, or 24,662 miles, a surprisingly accurate value under the circumstances. But by far the greatest of the Greek astronomers was Hipparchus (c.161–126 B.C.), a native of Bithynia, who has been justly called the Father of Astronomy. He was the author of the first star catalogue, from which, by comparing his own observations with those of Aristyllus and Timocharis, he was able to infer the precession of the equinoxes, with an accuracy which came within 5 per cent of the truth. Believing in the fixity of the earth in space, he was led to explain the inequality of the sun's motion by supposing that the earth was not situated exactly at the centre of the sun's orbit, and he proceeded to find the positions of perigee and apogee, and the eccentricity or distance of the earth from the centre of the orbit. He also constructed the first tables giving the position of the sun among the stars at any time. His contributions to lunar astronomy were no less important. He investigated the mean motion of the moon, the regression of her nodes, and the revolution of the line of apsides, and he detected the lunar inequality known as the evection. He was the first to use the eclipses of the moon in determining longitudes. After Hipparchus a gap of nearly three centuries occurs, in which the only notable astronomical advance was the reform of the calendar, which was carried out by Julius Cæsar with the aid and advice of Sosigenes of Alexandria. Second only in importance to Hipparchus was Ptolemy, who flourished at Alexandria about 130 A.D., and to whom was due a brief revival of the glories of the Alexandrian school. He wrote the *Almagest*, a compendium of the astronomical knowledge of his time, but his chief claim to fame rests on his invention of the Epicyclic System of the Universe, the germ of which was found in the teachings of Eudoxus. The Ptolemaic System, as it is generally called, makes the sun and planets move in circles whose centres are themselves in motion upon other circles, the earth being considered at rest. (See PTOLEMY; EPICYCLE; ECCENTRIC.) With Ptolemy the Alexandrian school practically ceased to exist, and no names of importance are found during the five centuries which elapsed before its final extinction in 640 A.D., when Alexandria was captured by the Caliph Omar.

During the next eight centuries, Europe was sunk in the gloom of the Dark Ages, and the flame of scientific learning was kept alive by the Arabs and the nations which came under their influence through the spread of Islam. Their knowledge of astronomy was derived from the writings of Ptolemy and the earlier Greek astronomers, and, while they made few positive contributions to the science, their improved methods of observation resulted in the greatly increased accuracy of their astronomical tables as compared with those of the ancients. The most important names are those of Al Battani, or Albategnius (c.900 A.D.) and Ulugh Beg, who lived about five centuries later. The latter, a

Tatar prince and grandson of Tamerlane, established an observatory at Samarcand and constructed the second known catalogue of stars.

Modern European astronomy begins with Purbach and Regiomontanus in the fifteenth century. Copernicus (1473–1543) stands out conspicuously as the author of a system of the universe nearly the same as that now accepted. (See COPERNICAN SYSTEM.) Copernicus was followed by Tycho Brahe of Denmark (1546–1601), who left a most important collection of solar and planetary observations as well as a catalogue of 777 stars far superior in precision to those of Hipparchus and Ulugh Beg. It was upon a discussion of Tycho's observations that his famous pupil Kepler (1571–1630) built his well-known laws of planetary motion, which are now accepted and which will be stated below. Galileo (1564–1642), one of the first constructors of the telescope, made with it unprecedented observations. To his gaze were first disclosed the moons of the planet Jupiter, and his clear mental vision saw in that planetary system a true miniature of our solar system itself—an ocular demonstration of the Copernican plan of the universe. To Galileo we owe also the discovery of the pendulum, perhaps the most important astronomical instrument. This was adapted to the astronomical clock by Huygens (1629–95), whereby observation in the modern sense was first rendered possible.

We come now to the great name of Newton (1642–1727). With him we may say that astronomy really begins; it is no longer purely a science of observation, but, by his transcendent powers of mathematical analysis, is elevated to its true position among the exact sciences. Newton's conception of the universe makes all phenomena of motion subject to a single law —the law of gravitation. (See GRAVITATION; FORCE; FALLING BODIES; PROJECTILES; NEWTON.) According to this, every material body attracts or draws every other material body with a force which varies directly as the product of the masses of the two bodies and inversely as the square of the distance between them. It is possible by mathematical reasoning to prove from Newton's Law just how a system of planetary bodies would move under the influence of the attraction of some larger central sun. We thus find mathematically that such motion must follow these three laws: 1. Each planet must revolve in an elliptic orbit having the sun in one focus. 2. The straight line joining the sun and planet must pass over equal areas in equal times. 3. The square of the time of revolution of each planet must be proportional to the cube of its mean distance from the sun. Now, these are precisely the laws found by Kepler from the actual observations of Tycho Brahe. Newton's law of gravitation is therefore seen to lead by deduction to the general facts actually observed by astronomers, and hence the mechanical construction of the solar system in which we live may be regarded as fully explained by Newton. Later investigators, among whom may be mentioned Euler (1707–83), Clairaut (1713–65), D'Alembert (1717–83), and Lagrange (1736–1813), elaborated his theory and carried the mathematical explanation of visible phenomena down to the minutest precision attainable with the most powerful modern observational machinery. The work of Newton may be said to have been crowned by that of Laplace (1749–1827), who analytically demonstrated the stability of the solar system, and whose *Mécanique céleste* was a worthy successor to Newton's *Principia*. The question now suggests itself as to whether this same law of Newton holds sway even to the most distant confines of the visible universe. Does it control the motions of stars whose vast distance allows us barely to glimpse them in our largest telescopes? The answer in the present state of astronomical knowledge is not quite so certain for the distant stellar systems as it is within our immediate neighborhood in space. Yet we may say that observations so far made have brought to light no phenomena positively contradicting the universality of Newton's Law.

With the invention of the telescope the progress of observational astronomy was profoundly stimulated. As already mentioned, Galileo's first great achievement with the new instrument was the detection of the four moons of Jupiter. He also discovered that Venus exhibited phases like those of the moon and noticed with astonishment that the planet Saturn at times appeared triple. Gassendi observed a transit of Mercury in 1631, and in 1639 Horrocks and Crabtree saw the first recorded transit of Venus. In 1655 Huygens found that the triple appearance of Saturn which had so puzzled Galileo was due to the presence of a flat bright ring surrounding the planet, and he also discovered the first of the Saturnian moons. This period saw the foundation of the Paris Observatory in 1671 under the direction of Giovanni Domenico Cassini, to whom we owe the detection of four more satellites of Saturn and the division in Saturn's ring which bears his name. He also determined the periods of rotation of Jupiter, Venus, and Mars. In the same year, Roemer, a Danish astronomer, deduced from the irregularity in the times of the eclipses of Jupiter's satellites the important conclusion that light travels with finite, though very great, velocity. Four years later, Greenwich Observatory was founded, and, under the direction of John Flamsteed, the first Astronomer Royal, began its long career of systematic observation of the heavens in which its supremacy was not seriously challenged for at least a century. Flamsteed's work was hampered for a long time by the lack of reliable instruments, but his catalogue of stars, *Historia Cœlestis*, the compilation of which is his chief claim to fame, showed a marked advance on previous works of a similar nature. Flamsteed's immediate successors in the post of Astronomer Royal were Edmund Halley and James Bradley. Halley devised the method of determining the sun's parallax from observations of the transits of Mercury and Venus and discovered the long inequality of Jupiter and Saturn, the elucidation of which called forth some of the most acute investigations in the field of gravitational astronomy on the part of Euler, Clairaut, and D'Alembert. Among his other important discoveries may be mentioned the variation of the compass, the acceleration of the moon's mean motion, and the proper motions of the stars. To Halley was also due the recognition of the periodic character of the comet which bears his name and the prediction of its return about 1759. Bradley's great contributions to astronomy were the discoveries of the aberration of light and the nutation of the pole. He left, moreover, a large mass of painstaking and accurate observations of the stars which formed

the basis of Bessel's epoch-making catalogue, *Fundamenta Astronomiæ*, published in 1813.

Little was done before the middle of the eighteenth century toward charting the southern heavens. Halley, indeed, had made a beginning during a visit to St. Helena in 1676, but his catalogue was hastily prepared and suffered in consequence. Seventy-five years elapsed before the work was taken up in earnest by the French astronomer, Lacaille. In 1751 he proceeded to the Cape of Good Hope, and during the next four years catalogued upwards of 10,000 stars, and outlined 14 new constellations of the southern sky. It was not, however, until the advent of Sir William Herschel (q.v.) that the thorough and systematic sweeping of the heavens was inaugurated. With the aid of larger and larger reflecting telescopes constructed by himself, he made four complete surveys of the northern skies, in the course of which he discovered the planet Uranus and two of its four satellites and added two more satellites of Saturn to those previously known. In his observation of nebulæ and double stars he was *facile princeps*, discovering no less than 2500 of the former and 800 of the latter; and his many contributions to the science have justly caused him to be called the founder of sidereal astronomy.

By his discovery of Uranus in 1781, Herschel simply confirmed the law of planetary distances, announced by Titius in 1772 and since known as Bode's Law, but there still remained a gap between Mars and Jupiter untenanted by any known planet. However, on the first day of the nineteenth century, Piazzi of Palermo announced the discovery of a small planetary body which was found to lie between those two planets and thus to conform to the law. The name "Ceres" was given to this minor planet. The discovery of Ceres was followed by the detection of three similar bodies in the course of the next seven years; these were Pallas and Vesta, discovered by Olbers in 1802 and 1807 respectively, and Juno, first detected by Harding in 1804. No others came to light until 1845, when Hencke found Astræa, and in 1847 three more were discovered—Hebe by Hencke, and Iris and Flora by Hind. Since then no year has passed without the detection of one or more of these bodies, and by 1890 about 300 had been found, but so long as visual methods only were employed their numbers remained relatively small. In 1891 Wolf of Heidelberg called in photography to his aid, and since that time the number has increased by leaps and bounds until in 1913 nearly 800 had been definitely catalogued and numbered. The minor planets, or planetoids as they are called, form a group of bodies which, with few exceptions, travel in orbits lying entirely between Mars and Jupiter. The most notable of these exceptions is Eros, which was discovered in 1898 by Witt. Part of its orbit lies between the earth and Mars, so that, with the single exception of the moon, it is our nearest celestial neighbor. On this account it has acquired a special importance, since it affords astronomers another means of determining the solar parallax and consequently the sun's distance from the earth. The supreme achievement in the field of planetary discovery, however, was the prediction and immediate discovery of Neptune in 1846. This was due to the genius of two young men—one a Frenchman, Urbain Jean Joseph Leverrier, the other an Englishman, John Couch Adams. It had long been observed that the motion of Uranus, the latest of the larger planets to be discovered, was subject to perturbations which could not be accounted for on the theory of disturbance by the other known planets, and as an explanation an unknown exterior planet had been suggested. To the solution of the difficult inverse problem of finding the mass and position of such a disturbing body from the perturbations of the disturbed, Leverrier and Adams devoted their powers of mathematical analysis with such complete success that, when the former announced the result of his investigations, the unknown planet was found without trouble on Sept. 23, 1846. Seventeen days later Lassell found Neptune's only satellite, and in 1851 the two remaining moons of Uranus, while Bond in 1846 added an eighth member to Saturn's family of satellites. It was not until 1877 that any further discoveries of satellites were made. In that year Hall of Washington discovered Phobos and Deimos, the only known satellites of Mars. Barnard in 1892 found the fifth satellite of Jupiter. In 1898 Pickering of Harvard succeeded in detecting Phœbe, the ninth, and in 1905 Themis, the tenth, satellite of Saturn. In the latter year also two more satellites of Jupiter were discovered by Perrine of the Lick Observatory, and another, making eight in all, was found by Melotte at Greenwich in 1908; all three are remarkable for the great distance at which they revolve about the primary. Certain unexplained anomalies in the motion of Mercury led Leverrier in 1859 to suggest the possibility of the existence of a planet lying between Mercury and the sun, but in spite of the most careful search no such body has yet been found. Whether there exist other planets beyond the orbit of Neptune is uncertain, but the "residual errors" of Uranus and the slight perturbations in the motion of Neptune which cannot be attributed to the known planets have induced astronomers to consider at least such a possibility. Pickering has arrived at the conclusion that an ultra-Neptunian planet, which he terms "O," is revolving round the sun at a distance 52 times as great as that of the earth, while Gaillot has suggested that there may be two such bodies—one lying between the orbit of Neptune and that of Pickering's hypothetical "O," and the other at a distance of more than twice the radius of Neptune's orbit.

The labors of Sir William Herschel and his predecessors in systematically observing the positions of the stars resulted in the accumulation of a large mass of material which was to prove of the utmost service to the astronomers of the nineteenth century, but instrumental imperfections made it impossible to take the fullest advantage of these observations. It was by Friedrich Wilhelm Bessel that the necessary step was taken which rendered the observations of the astronomers of the eighteenth century fully available. Before his time increased accuracy of observation had been largely sought by effecting mechanical improvements in the instruments used, and corrections for precession, nutation, and aberration, due, in the first case, to the slow secular, and, in the others, to the periodical shifting of the points of reference, had been applied by astronomers in somewhat haphazard fashion and with varying degrees of success. Bessel at once placed the whole matter on a firm foundation by his elaboration of a theory of instrumental errors which he applied to the

observations, left by Bradley. Bessel's labors were not confined to the reduction of Bradley's observations which covered only 3222 stars, but by his own careful and industrious work he brought the number of accurately known stars up to more than 50,000. Not the least important of Bessel's services to sidereal astronomy was the training of Argelander, to whom was due the compilation of the great Bonn *Durchmusterung*, which raised the number of accurately known stars of the northern hemisphere to more than 300,000, and, if the stars of the southern hemisphere observed by Schönfeld are included, to more than 400,000. The work of mapping the stars of the southern hemisphere was completed by Sir David Gill in his *Cape Photographic Durchmusterung*, which was begun in 1885, and completed in 1900 by the reduction of the negatives by Professor Kapteyn of Groningen. The value of the camera as an adjunct to a survey of the heavens was strikingly shown in this case, for the entire work was carried out twice in less than six years. This work, which did for the southern heavens what Argelander's work had done for the northern, gives the places of more than 450,000 southern stars. But all previous catalogues will be eclipsed by the *International Star Chart and Catalogue* which was initiated by the International Astrographic Congress which met at Paris in 1887.

Until Bessel's time the question of stellar distances which had long vexed astronomers remained unsolved. The fixed stars are so immeasurably more remote than the members of the solar system that, although the base line for the measurement of their parallaxes is the radius of the earth's orbit, the parallactic angle is found to be so small that a new unit of distance, the "light-year," or the distance traveled by light in one year, has been adopted for the purpose of expressing the distance of the stars in suitable terms. In general, it may be said that brightness and the possession of a large proper motion are the criteria of the nearness of any star. In 1792 Piazzi had discovered that the star 61 Cygni had a large proper motion of about five seconds annually, indicating its comparative proximity to the earth. Twenty years later Bessel confirmed Piazzi's determination of the motion of this star, but not until the end of 1838 was he in a position to announce its parallax, which he found to be about a third of a second. Only a few weeks after this epoch-making announcement, Henderson announced that $\alpha$ Centauri had a parallax of a second, an amount which has since been reduced somewhat by later observers. The work of Bessel and Henderson opened up a field of investigation in which Gill, Elkin, Kapteyn, Pritchard, Peter, and others have since labored with conspicuous success. Between 200 and 300 stars have had their parallaxes determined, but so far none has been found to be nearer than $\alpha$ Centauri, which is situated at a distance of about four and a half light-years from us.

Reference has already been made to the great stimulus given to the study of astronomy by the invention of the telescope. The first telescopes were refractors, i.e., the image was formed by refraction through a lens and consequently suffered from the defect of being chromatic. Gregory in 1663, and later Newton, in 1669, introduced new designs in which the image was formed by reflection instead of refraction, and for a long time this form of telescope was preferred. It was steadily improved in both size and power until at the hands of Sir William Herschel it attained a diameter of 4 feet and a focal length of 40 feet. This remained for 60 years the limit for instruments of this type, but in 1845 it was eclipsed when a reflector of 6 feet diameter and 54 feet focal length was constructed by Lord Rosse at Parsonstown, Ireland. The largest reflectors in actual use at present are the 5-foot instruments of the Harvard and Mount Wilson observatories. A still larger one, with an aperture of 100 inches, is being constructed for the Mount Wilson Solar Physics Observatory. The development of the refracting telescope may be said to date from 1758, when Dollond of London succeeded by the use of two lenses—one of flint, the other of crown glass—in overcoming the defect of chromatism. But the difficulty of making flint-glass lenses of any considerable size proved a serious obstacle to the growth of the refractor, which was removed only when Guinand and Fraunhofer, during the early years of the nineteenth century, succeeded in manufacturing disks up to 15 inches in diameter. These were surpassed by the Clarks of Cambridgeport, Mass., whose efforts during more than 50 years culminated in the construction of the 36-inch refractor of the Lick Observatory and the 40-inch Yerkes telescope, with both of which results commensurate with the size of the instruments have been obtained.

While the large instruments of the nineteenth century have resulted in the sounding of the heavens to an extent not dreamt of by the earlier observers, other instruments have contributed in no less degree to the progress of the science, and the chief advances of the nineteenth century have come from the application of the spectroscope, the photometer, and the camera to astronomical research.

One of the latest and most interesting developments of astronomy is the inauguration of international coöperation in astronomical research. We have already alluded to the great *Star Chart and Catalogue*, first projected by the International Astrographic Congress in 1887 and now approaching completion. Another important undertaking of this body was the determination of the solar parallax from observations of Eros at its opposition in 1900, and a still more formidable attack on this problem is planned for 1931, when the next opposition takes place. Mention may also be made of the work of the International Latitude Service in determining the variation of latitude due to the "wandering" of the pole, and the investigation of the period of rotation of the sun by the International Union for Coöperation in Solar Research. The huge scale on which it is possible to plan undertakings like those mentioned above, and the completeness with which they can be carried out, have already led to important discoveries and indicate that international coöperation is destined to result in even greater gains to astronomical science.

Consult also ABERRATION, *Constant of Aberration;* ASTROPHOTOGRAPHY; ASTROPHYSICS; COMET; CONSTELLATION; COSMOGONY; DOUBLE STARS; EARTH; ECLIPSE; JUPITER; MARS; MERCURY; METEORS; MOON; NEBULÆ; NEPTUNE; OBSERVATORY; PLANETOIDS; PLANETS; SATURN; SEASONS; SOLAR SYSTEM; STAR; SUN; TELESCOPE; URANUS; VARIABLE STARS; VENUS; YEAR.

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found useful in a more detailed study of the science of astronomy: Grant, *History of Physical Astronomy* (London, 1852); Chauvenet, *Manual of Spherical and Practical Astronomy* (Philadelphia, 1863); Young, *The Sun* (New York, 1881); Newcomb, *Popular Astronomy* (New York, 1882); Oppolzer, *Lehrbuch zur Bahnbestimmung* (Leipzig, 1882); Doolittle, *Treatise on Practical Astronomy Applied to Geodesy and Navigation* (New York, 1885); Young, *Textbook of General Astronomy* (New York, 1888); Tisserand, *Traité de mécanique céleste* (4 vols., Paris, 1889–96); Lockyer, *Dawn of Astronomy* (London, 1894); Ball, *Atlas of Astronomy* (New York, 1893); Valentiner, *Handworterbuch der Astronomie* (Karlsruhe, 1896); Berry, *Short History of Astronomy* (London, 1898); Darwin, *The Tides, and Kindred Phenomena in the Solar System* (Boston, 1898); Ambronn, *Handbuch der astronomischen Instrumentenkunde* (2 vols., Berlin, 1899); Ball, *Story of the Heavens* (New York, 1900); Lockyer, *Recent and Coming Eclipses* (New York, 1900); Newcomb, *Elements of Astronomy* (New York, 1900); Comstock, *Text-book of Astronomy* (New York, 1901); Newcomb, *The Stars* (New York, 1901); Krisch, *Astronomisches Lexikon* (Vienna, 1902); Jacoby, *Practical Talks by an Astronomer* (New York, 1902); Newcomb, *Astronomy for Everybody* (New York, 1903); Lowell, *The Solar System* (Boston, 1903); Pickering, *The Moon* (New York, 1903); Fahie, *Galileo: His Life and Work* (London, 1903); Pickering, *Photographic Atlas of the Moon* (London, 1904); Turner, *Astronomical Discovery* (New York, 1904); Macpherson, *Astronomers of To-day: Their Work* (London, 1905); Baly, *Spectroscopy* (London, 1905); Ball, *Popular Guide to the Heavens* (London, 1905); Clerke, *The System of the Stars* (London, 1905); Dreyer, *History of the Planetary System* (Cambridge, 1906); Bryant, *A History of Astronomy* (London, 1907); Gore, *Astronomical Essays, Historical and Descriptive* (London, 1907); Hale, *Study of the Stellar Evolution* (Chicago, 1908); Poor, *The Solar System* (New York, 1908); Clerke, *Popular History of Astronomy in the Nineteenth Century* (London, 1908); Schuster, *Solar Research* (Manchester, 1909); Chambers, *The Story of the Comets* (Oxford, 1909); Turner, *Modern Astronomy* (London, 1909); Lowell, *The Evolution of Worlds* (New York, 1910); Abbot, *The Sun* (New York, 1911); Dreyer, *A Short Account of Sir William Herschel's Life and Works* (London, 1912); Campbell, *Stellar Motions* (New Haven, 1913); Jacoby, *Astronomy* (New York, 1913).

**ASTROPALIA** (It. *Stampalia*), the modern Greek name for the classical Astypalæa. An island of the Sporades (q.v.), 20 miles southeast of Amorgos (Map: Greece, H 5). It is mountainous, consists of an eastern and western half connected by the isthmus, and has good harbors. Its area is 62 (according to others, 84) square miles. Its population is about 2000, mostly residing in the town of Astropalia, on the isthmus. By imperial edict it held the rank of a free state under the Roman emperors. A Venetian possession in the Middle Ages, it has belonged to the Turks since the sixteenth century.

**ASTROPHEL.** The name under which Sir Philip Sidney disguised his identity in writing the sonnets to "Stella," 1575–83. These poems appeared in 1591 and are considered the author's most remarkable achievement. Also the title of Spenser's elegy on Sidney.

**ASTROPHOTOGRAPHY** (Gk. *ἄστρον, astron*, star + *photography*). In no department of astronomy has development in recent years been so marked as in the application of photographic processes of observation. If photography could accomplish nothing more than what it has done and is doing for descriptive astronomy alone, we should still rank it among the most powerful weapons in the armory of the astronomer. It is but necessary, for instance, to examine a series of eye and hand drawings of some total eclipse, executed by different skilled observers at the same time, to come at once to the conclusion that it is well-nigh impossible to obtain correct information in this way; even the outlines of the corona and prominences will sometimes differ so greatly that one would scarcely believe an attempt had been made to delineate the same objects. Photography, of course, gives us a far more faithful picture, and thus furnishes observational material of specially high value. But even more important, perhaps, are the services it is capable of rendering to the astronomy of precise measurement, and photographic processes seem to be destined to replace the less facile visual methods which were employed exclusively until a few years ago. The heliometer (q.v.) is generally known as the most exact instrument for executing measurements on the sky. Yet, in the opinion of some of the highest authorities, the equality of photographic results with those of the heliometer may now be considered as conclusively demonstrated. The year 1892 saw the first complete publication of an extensive series of results. These were derived from excellent photographs of the cluster Pleiades, made in 1872 and 1873 by Rutherfurd, in New York. These results have been followed in the last few years by many other star-cluster measures, so that an extensive mass of material is being gathered by photography—material of the highest precision and of the last importance in stellar astronomy.

It is only by the study of minute inter-stellar changes in the star-clusters that we may hope, within the bounds of human time, to throw some light upon the problems of motion within the greater universe that lies beyond our own solar system; and it is to photography that we must look for our observational material. Generalizations of science can be secured only by the discussion of very large masses of observations; but although the heliometer can give us sufficient precision, it involves so much labor that by its exclusive use astronomy could not hope to do more than touch the surface of those great problems.

An account of the immense advances made, since the introduction of photography, in our knowledge of planetoids is given in a special article concerning these bodies. Suffice it to mention here that the photographic revelations in this important field have culminated in the discovery of the planet Eros (q.v.), now known to be, with the exception of the moon, our nearest neighbor in space. Many comets, too, have been discovered, and many doubtless will be discovered with the aid of photography; and it is photography again that furnishes the means of determining their positions and measuring their orbits with greater facility than could be obtained by any other method at present known. There is no doubt, further, that photography will greatly increase the list of known distances between the earth and remote

heavenly bodies (see PARALLAX), and that before many years it will replace the eye even in noting the instant of a star's transit across the meridian of an observatory. See TRANSIT INSTRUMENT.

But decidedly the most complete triumph of astrophotography is Gill and Kapteyn's Cape of Good Hope photographic *Durchmusterung*, the results of which are comprised in a remarkably complete catalogue of the southern heavens. In the year 1882 a very bright comet appeared in the sky, and was especially conspicuous in the southern hemisphere. Its brightness led Gill, at the Cape of Good Hope Observatory, to attempt to photograph it. In examining the negative, Gill's attention was attracted to the large number of stars appearing on the plate as minute points or dots, and it was these that first suggested to him the possibility of making a complete examination of the heavens with the aid of photography.

The German term *Durchmusterung*, now naturalized in scientific English, was first applied to Argelander's great catalogue of stars in the northern half of the sky, a work which has rendered possible many statistical and other researches of far-reaching importance in stellar astronomy. But Argelander and his successor, Schönfeld, observing at Bonn, in Germany, were able to carry on their survey only a short distance beyond the northern half of the sky. Gill, in his observatory at the Cape of Good Hope, far south of the equator, saw the possibility of extending Argelander's work, by means of photography, to the South Pole. To have so extended it by the visual methods that were used by Argelander would have required an enormous expenditure of time and labor; but a small photographic telescope was procured, and, in the hands of C. Ray Woods, a scientific photographer who was summoned from England, a complete collection of plates of the southern sky was made. The negatives were sent to Groningen, Holland, and were there measured by Kapteyn. The resulting catalogue, published in three large volumes by the British government, is found to possess even greater completeness than Argelander's; for the fallible human eye could not avoid omitting a star now and then, while the photographic plate is of course subject to no such error.

The Cape *Durchmusterung* is, however, not the only great result to which Gill's 1882 comet photograph has led. The *Durchmusterung* was carried out much on the same lines as Argelander's older work in the northern hemisphere, the idea being to make a census of all the stars in the sky down to a given magnitude, even if it should be impossible to give more than a rough approximation of their positions in the sky. But the success of the first enterprise led Gill to conceive the idea of preparing a new star catalogue that should satisfy the condition of high precision as well as that of completeness as to numbers. So vast an undertaking could be rendered possible only by the combined efforts of many astronomers and many observations, and, as the result of preliminary correspondence, a meeting to consider the subject was called at Paris by the French government in 1887. Delegates from all the civilized nations attended this Astrographic Congress, as it was called, and it was decided that the proposed photographic catalogue of precision should really be made, that it might stand for all time as the foundation of research in sidereal astronomy. Eighteen observatories have since been engaged in carrying out this astronomical enterprise, the greatest the world has ever seen. To make error of any kind practically impossible the photographs are taken in duplicate, the number of plates required being 44,108, representing a surface of four square degrees. All stars down to the fourteenth magnitude, the estimated number of 20,000,000, will be shown on the charts, while all stars down to the eleventh magnitude, numbering about 2,000,000, will be subjected to precise measurement and will have their places recorded in the catalogues which are to be published with the charts. Already considerable progress has been made with the publication of the charts and catalogues, many of the volumes having appeared since 1900. In 1909, however, it was found that while some of the observatories to which the work was originally allotted had practically completed their share, others, for various reasons, were far in arrears, and the work still remaining to be done was assigned to the more active observatories by the permanent committee of the Astrographic Congress. It is now highly probable that the year 1920 will see the completion of this great international undertaking.

Besides Rutherfurd other American astronomers have distinguished themselves in the new methods of observation. Probably the first really successful celestial photograph was made in 1840 by J. W. Draper. He was able to obtain negatives of the moon, showing the principal formations of her surface. Ten years later, in 1850, Bond and Whipple made still better moon pictures at Harvard College, Cambridge, Mass. Coming down to more recent years we find among American photographic astronomers, Pickering, who has done much in the photography of stellar spectra and in other departments of astrophysical photography; Hale, who has succeeded in photographing the solar prominences and faculæ in full sunlight and who, by his detection of the Zeeman effect in sun-spot spectra, has established the existence of strong magnetic fields in sun-spots; Campbell, who has determined photographically the velocities of motion in many of the stellar systems; Adams, who has made an exhaustive study of the rotation of the sun; St. John, whose spectrophotographic investigations have disclosed the circulatory system of the sun-spot vapors; and Ritchey, whose photographs of nebulæ and globular clusters have thrown new light on the constitution of these bodies. See ASTRONOMY.

More detailed information on the subject of astrophotography may be found in the *Bulletin du comité permanent de la carte du ciel*, vols. i, ii (Paris, Institut de France), Scheimer, *Photographie der Gestirne* (Leipzig, 1898), and Turner, *The Great Star Map* (London, 1912).

**ASTROPHYSICS.** The branch of astronomy which deals with the nature, physical condition, temperature, and chemical constitution of the celestial bodies. Owing to the inaccessibility of the heavenly bodies by ordinary means, the astronomer is entirely dependent for his knowledge of their physical and chemical properties on the energy which is radiated from them in the form of light and heat. The instruments which enable him to acquire this knowledge are the spectroscope, the bolometer, the photometer, and the camera. Of these the most important is the spectroscope, which depends for its operation

on Newton's discovery of the composite nature of sunlight and the possibility of separating it into its components by refraction through a prism. Melvill, in 1753, discovered that various chemical substances when burnt in an alcohol flame imparted a distinctive color to it, and that the spectra of such flames were not continuous but were made up of a few colors only. Fifty years later, Wollaston, using a narrow slit instead of a round hole for the admission of light, made the discovery that the solar spectrum was traversed by seven dark lines, but the significance of these lines escaped him. It was reserved for Fraunhofer, in 1815, to show that the dark lines were far more numerous than Wollaston had supposed, in fact, he found that the solar spectrum was crossed by hundreds of these lines and that many of them coincided in position with the bright lines due to glowing metallic vapors. Many theories were brought forward to account for the phenomenon, but it was not until 1859 that Kirchhoff showed that when sunlight is passed through glowing sodium vapor, the dark lines corresponding to that element are not effaced but, on the contrary, darkened. In this way he came to the conclusion that sodium, iron, calcium, and other terrestrial elements were actually present in the atmosphere of the sun, and thus laid the foundation of solar and stellar chemistry, the study of which has since been so fruitful in results.

Although the development of astrophysics has been almost entirely due to the use of the spectroscope, the foundation of the science may be said to date from the year 1826, when Schwabe began his study of the sun-spots, those great temporary breaks or openings which appear from time to time in the surface of the sun, and which are often 100,000 miles in diameter. He found that in some years the number of spots observed was very large, while in others only a few were seen, and in 1843 he was in a position to announce that the years of maximum sun-spot activity recur at intervals of 10 years. Later investigators have fixed this period at 11.11 years, and have shown that it coincides with the period which governs magnetic disturbances on the earth as well as the occurrence of the aurora borealis. Modern sun-spot research is largely spectroscopic, and has established the fact that the sun-spots are the seats of intense cyclonic action in the photosphere, while Hale, by his detection of the Zeeman effect in their spectra, has conclusively proved that they are also magnetic fields of great intensity.

The application of the spectroscope to the study of the sun and the stars may be regarded as the second stage in the development of astrophysics. The third great advance was made when the principle of the effect of motion on the refrangibility of light, first enunciated by Christian Doppler in 1842, was applied to the study of stellar motions. The telescope had enabled astronomers to determine the velocities of stars at right angles to the line of sight, because such a motion gave rise to a displacement of the positions of the stars on the celestial sphere, but it was unable to reveal any movement which might be taking place along the line of sight. Doppler's principle is briefly this: When a body emitting light is in motion towards us, the number of vibrations reaching us in a second is increased by an amount depending on the relative velocity of approach, and consequently the corresponding spectrum lines are shifted toward the violet end of the spectrum, while if the star is receding from us, the lines are shifted toward the red end of the spectrum. The possibility of the use of this principle in determining end-on motions was first suggested by Fizeau in 1848, but it was not until 1868 that Huggins actually applied it and succeeded in measuring the radial velocities of Sirius and other stars. This epoch-making achievement was followed, three years later, by Vogel's determination of the period of rotation of the sun from observations of the relative shifting of the solar lines due to light from the eastern and western limbs of the sun. So long, however, as the shifting of the lines was observed by visual methods alone, the results obtained were unsatisfactory, for the displacements are minute and difficult to estimate, and the lines, being often somewhat hazy, do not lend themselves well to accurate measurement, while the human eye itself adds a further uncertainty from its tendency to exaggerate the effects observed. These difficulties were obviated by Vogel's introduction of the spectrograph in 1888. In this instrument the camera takes the place of the eye, and the displaced lines are recorded on the photographic plate along with standard lines of reference from terrestrial sources, so that far greater accuracy of measurement is now possible.

The vast field of research opened up by Kirchhoff and Huggins has attracted a host of workers whose labors have been rewarded with such an abundant harvest of results that only a few of the most important can be mentioned here. Stars are now classified according to the character of their spectra; the first classification of this kind, since considerably extended by Pickering of Harvard, was made by Father Secchi in 1863, while other schemes of classification have since been proposed by Lockyer and Vogel. Nebular astronomy has been revolutionized; Huggins, in 1864, established the gaseous nature of the nebulæ by means of the spectroscope, and Keeler, in 1890, succeeded in obtaining the first reliable evidence of the existence of nebular radial motions. Stellar photometry has been prosecuted assiduously by Pritchard and Pickering, who have published photometric catalogues of the stars; and the latter has contributed a new and valuable method of research by his introduction of photographic photometry. By means of the spectroscope double stars are resolved into their components even when those components are too close to be separated by the telescope. In solar physics striking results, some of which have already been referred to, have been obtained, and the field has grown to be so extensive that observatories, like those at Mount Wilson (California), Mendon (France), Kodaikanal (Madras), and South Kensington, have been established, the work of which is restricted almost entirely to the prosecution of this important branch of astrophysics. See DOUBLE STARS; NEBULÆ; STARS; SUN; SUN-SPOTS; VARIABLE STARS.

Consult: Steiner, *Die Spektralanalyse der Gestirne* (Leipzig, 1890); Clerke, *Problems in Astrophysics* (New York, 1903); Baly, *Spectroscopy* (London, 1905); Clerke, *The System of the Stars* (London, 1905); Schuster, *Solar Research* (Manchester, 1909); Abbot, *The Sun* (New York, 1911); Campbell, *Stellar Motions* (New Haven, 1913).

**ASTRUC,** ȧs'trȳk', JEAN (1684–1766). A distinguished physician. He was born at Sauves,

in Languedoc, March 19, 1684. He studied at Montpellier, where he took his degree as doctor in 1703, and where he lectured (1707–09). In 1711 he was appointed to a professorship at Toulouse, and in 1716 he was called to a chair in medicine at Montpellier. In 1729 he became physician to the King of Poland, but the next year accepted a chair at Paris, where he died on May 5, 1766. His most important works are his dissertations on the epidemic diseases, published at the time of the plague (1722–25); his great work on venereal diseases (*De Morbis Venereis*), that appeared at Paris in 1736; his *Tractatus Therapeuticus et Pathologicus* (Venice, 1748); and his epoch-making *Conjectures sur les mémoires originaux dont il paraît que Moïse s'est servi pour composer le livre de la Genèse* (Brussels, 1753). The last book was written in the apologetic interest of curing what the author called "the malady of the century"—the doubt as to the Mosaic authorship of the Pentateuch. It furnished the clue to the documentary analysis of this work, which has occupied scholars ever since (see PENTATEUCH), by calling attention to the fact that in the Hebrew text of Genesis the name for God is sometimes Elohim and sometimes Yahwe, and that the passages employing the first of these names seem to differ in fundamental conceptions from those in which the second is used. Astruc inferred from this that Moses had used different sources in compiling Genesis.

**AS'TRUP**, äs'trŭp, EIVIND (1870–96). A Norwegian explorer, born at Christiania. He came to America in 1891 and in the same year joined the Peary expedition to Greenland. In 1893–94 he was a member of the second Peary expedition to Greenland and made the first survey of the northern and northeastern coast of Melville Bay. He lost his life during a snowshoe expedition from Dovre, Norway. His body was found Jan. 21, 1896, at Lille Elvedälen. His published works include *Blandt Nordpolens Naboer* (1895).

**ASTURIAS**, äs-tōō'rĭ-äs (from Basque *asta*, rock + *ura*, river; literally, 'the country of the dwellers by the rocky river'). A former division of Spain, now included in the province of Oviedo, bounded on the north by the Bay of Biscay, east by Santander, south by León, and west by Galicia. The low hills of León and Old Castile rise gradually to the mountain chain which forms the southern boundary, towering to a height of nearly 9000 feet in the summit of Torre de Cerredo. The northern slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain. The climate is damp, as the clouds and fogs of the Atlantic hang continually about the snow-capped mountains. The principal kinds of wood are oak, chestnut, and silver and Scotch firs; in the more remote districts the forests are superb. Pasturage is found along the slopes in the narrow valleys, supporting an excellent breed of horses and cattle. In the wider valleys, barley, wheat, maize, figs, olives, grapes, and oranges are cultivated; along the coast are excellent fisheries. Copper, iron, lead, cobalt, arsenic, antimony, and coal are found in the province.

Asturias became a place of refuge for the Goths in the eighth century. Here the famous Pelayo was made King in 718, and his successors, continuing the fight against the Arabs, became kings of León in the tenth century. Because of this long struggle against the Moors and the consequent exclusive sentiments of the Asturians which kept them free from foreign domination other than that of the Romans and the Goths, they are probably to be regarded as the purest representatives of the original Iberian race; and their language (*lenguage bable*) furnishes much light upon general problems of Castilian linguistics. (See recent studies by Ramón Menéndez Pidal.) The Asturians still boast of their independence as free Hidalgos and are simple in manners and brave, but less industrious and sociable than their neighbors in Biscay and Galicia. They have been termed the Swiss of Spain, and they are equally faithful and fond of money. The Vaqueros form a distinct caste in the province, intermarrying among themselves and leading a nomadic life, wintering on the seacoast and summering on the hills of Leytariegos. Oviedo, the capital, has, since 1833, given its name to the whole province. The other important towns are the ports of Gijón and Avilés. The area of the province of Oviedo is 4207 square miles, with a population in 1900 of 627,069.

Since 1388 the heir-apparent, whether male or female, to the crown of Castile, and later to the crowns of the Spains, has been known as Prince, or Princess, of Asturias.

**ASTYAGES**, ăs-tī'ă-jēz (Gk. *Ἀστυάγης*, in the Babylonian inscriptions called *Ištuvēg*, 'the good warrior'). The last King of Media, son and successor of Cyaxares, reigned c.584–550 B.C. According to the story told by Herodotus, Astyages, on account of a dream, gave his daughter Mandane in marriage to Cambyses, a Persian of eminence; but later, being influenced by an alarming dream, he sent Harpagus to destroy the child which was the fruit of the marriage. But the child Cyrus (q.v.) was hidden away by a shepherd, and was after many years brought to the notice of Astyages, who easily discovered the boy's parentage. Astyages punished Harpagus for deceiving him, and Harpagus instigated the bold and ambitious Cyrus to lead a revolt of the Persians, through which Astyages was made prisoner, and Cyrus took the sceptre. Astyages was treated mildly, but kept a prisoner until his death. According to the more reliable account given in the Babylonian inscriptions of Nabonidus, Cyrus, the King of Anzan, revolted against his lord, Astyages. The troops of Astyages deserted him and delivered him to Cyrus, who captured Ecbatana in 552 B.C.

**ASTY'ANAX** (Gk. lord of the city, from *ἄστυ*, *astu*, city + *ἄναξ*, *anax*, ruler, lord). The son of Hector and Andromache, deported, according to the story, with his mother from the ruins of Troy by Pyrrhus. Upon the fortunes of these two Trojans Racine has founded his admirable tragedy, *Andromaque*. At the death of Pyrrhus, Astyanax became King of Epirus. According to another legend, he was hurled from the walls of Troy, in fulfillment of an oracle.

**ASUNCIÓN**, ä-sōōn'syōn', NUESTRA SEÑORA DE LA, nwā'-strà sā-nyō'-rà dā là. The capital of Paraguay, an episcopal city, situated on the east bank of the Paraguay River (Map: Argentina). It was founded in 1536, on the feast day of the Assumption of the Virgin (August 15), and for more than a century was the capital of all the Spanish territory in the valley of the Rio de la Plata. Among the notable buildings are a cathedral, several churches, a government palace, a public library, and a national college, and there is an agricultural

school. The regularity of its streets and its fine situation on the river bank make it notable among South American cities. A railway connects Asunción with Eucarnacion, on the Paraná, a distance of nearly 250 miles, and in 1913 through train service to Buenos Ayres was established. There is a line of river steamers connecting Asunción with Buenos Ayres and Montevideo. There are distilleries, mills, foundries, and shipyards, and manufacturing is carried on to a large extent. This city is the chief centre of trade for the country and has a considerable commerce, the principal articles of export being leather, tobacco, sugar, and *yerba maté*, or Paraguay tea. Pop., 1895, 45,000; 1900, 51,700; 1905, 60,259; 1912 (est.), 84,000.

**ASUR**, ä'sōōr. See ASSYRIA.

**ASURBANIPAL**, ä'sōōr-bä'nê-pâl. See SARDANAPALUS; ASSYRIA.

**ĀSVAGHŌSHA**, åsh'vâ-g'hō'shâ, or **ĀÇVAGHOSA.** A Buddhist monk, author of a life of the Buddha, written in Sanskrit, and entitled *Buddha-carita*, or "Acts of the Buddha." He lived in the second or the fourth century A.D., and his poetical work on the legend of Buddha follows the manner of a classical Sanskrit epic, but is written with the elaboration and artificiality of the later court poetry. It was translated into Chinese between 414 and 421 A.D. For the Sanskrit edition consult Cowell, *Açvaghosha's Buddha-carita* Oxford, 1893), and *Sacred Books of the East*, vol. xlix; and on the Chinese version consult Asvaghosha, *Discourse on the Awakening of Faith*, translated by Suzuki (Chicago, 1900).

**ĀSVĀLAYANA**, or **ĀÇVALYANA**, åsh'vâ-lä'yâ-nâ. The name of an ancient Sanskrit author, familiar in connection with Vedic literature, because of the Srauta-Sūtra and the Grhya-Sūtra, which bear his name. See VEDA.

**ASVAMEDHA**, äs'vâ-mād'hâ (horse-sacrifice). A Vedic and later Hindu rite, believed to be efficacious in insuring progeny.

**ASVINS**, äs'vĭnz. Two Vedic divinities of the heaven, the Aryan Dioscuroi, later called Dasra and Nasatya. They are the first bringers of light in the morning sky, and the husbands of Surya, daughter of the sun god. The Asvins are the divine physicians and are frequently implored in the Rigveda, where they are always addressed together for release from ills of all kinds. Consult Bergaigne, *La religion védique*, vol. ii (Paris, 1878–83), and Macdonnell, *Vedic Mythology* (Strassburg, 1897).

**ASWAIL**, äs'wāl. See BEAR.

**ASWAN**, å-swän'. See ASSUAN.

**ASY'LUM** (Lat. Gk. ἄσυλον, *asylon*, right of sanctuary, refuge, a place safe from violence, from *ἀ*, *a*, priv. + *σύλη*, *sylē*, right of seizure). A place of refuge. 1. In ancient times sacred places, especially the temples and altars of the gods, were appointed as asylums to which criminals as well as persecuted individuals might flee for refuge, and to molest them in such places was regarded as an impiety. An analogous institution is the "cities of refuge" (Num. xxxv. 9–34). Among the Greeks in early times these asylums might be sometimes useful in preventing hasty retribution; but in the course of time they were so much abused that their sanctity was in a great measure disregarded. Thus Pausanias, who fled to the altar of Athene, was taken and slain there by the Lacedæmonians, and in other cases the refugee was compelled to leave the asylum by fire or starvation. In Rome the Emperor Tiberius abolished all such places of refuge from law, excepting those in the temples of Juno and Æsculapius. The custom of allowing to real or supposed criminals a place of safety in temples was also adopted by the Christian church. In the time of Constantine the Great the churches were made asylums; and Theodosius II extended the privilege to all courts, alleys, gardens, and houses belonging to the Church. In 681 A.D. the Synod of Toledo extended the privilege of asylum to a space of 30 paces around every church. In the lawless periods of the Middle Ages the influence of the Church often prevented deeds of gross injustice and violence; but the sanctity of churches was abused by criminals, and this led to several modifications which gradually destroyed the privilege of sanctuary (q.v.). In England it was abolished by acts passed in 1534 and 1697. 2. The word "asylum" is now applied to places of shelter for unfortunate or destitute persons and to hospitals for the insane. See LUNACY.

**ASYLUM, RIGHT OF.** In international law, a privilege accorded by the law of nations or by custom to foreign legations to shelter within their precincts persons subject to the jurisdiction of the state in which such legation is maintained. As this definition indicates, the right, so far as it exists at all, is a right to *extend* protection, not to *claim* it; and this circumstance differentiates it strikingly from the institution of asylum or sanctuary (q.v.) as practiced in primitive society. See ASYLUM, above; and also AVENGER OF BLOOD; CITY OF REFUGE.

The right of asylum originated in the fiction of extra-territoriality (q.v.), or the extension by a state of its territorial jurisdiction by its legations into the territory of another state, to the exclusion, so far as the precincts of the legation were concerned, of the domestic jurisdiction. The person taking refuge within the legation was deemed to have come under the protection of its flag, and, so long as he remained there, to be as completely exempt from the legal or executive process of the country as if he had escaped to the foreign territory represented by the legation. He might be surrendered by the government under whose flag he had taken refuge, at its pleasure, or as the subject of extradition (q.v.) proceedings; but any attempt to take him by force was an invasion of the territory of the state in whose legation he was sheltered. This is the theory upon which the alleged right of asylum rests, but it is a theory so clearly at variance with the real basis of international relations of independent states, and it has been so discredited by the abuses to which its application has led, that it has completely broken down. The fiction of extra-territoriality having been abandoned, attempts have been made to justify the right of asylum by the doctrine of the inviolability (q.v.) of diplomatic agents (q.v.), the members of their families, their official houses and property. But, in practice as well as in theory, this doctrine, which is intended only to guarantee the perfect freedom and fearlessness of the minister in the discharge of his functions as the representative of a foreign government, is strictly applicable only to the bona fide members of his household, not to visitors, and still less to strangers temporarily residing with him.

Notwithstanding the absence in international law of any justification of the right of asylum, it has been frequently granted in modern times, but only in countries whose civil institutions

fail to command the respect of foreign states, and in times of civil tumult. It was repeatedly practiced by the representatives of the Powers in Greece during the Revolution of 1862, and in Spain in the periods of anarchy between 1840 and 1850 and from 1865 to 1875. In the Spanish-American states it has been a common and recognized practice to protect in the legations the successive victims of the frequent revolutions by which changes in administration are commonly effected, and the legitimacy of the practice has not infrequently been acquiesced in by the state in which it occurred. This condition of affairs has given a certain legal sanction to the right of asylum in those countries, though it is usually justified by the states exercising it, not on legal grounds, but upon grounds of humanity. It is, however, universally conceded that it has no application to ordinary criminals, but only, as a measure of temporary protection, to political offenders. Even in this restricted form the practice has been generally discouraged and forbidden by the United States government, though the grant of asylum by our ministers in Central and South America has in exceptional cases been condoned or approved by the Department of State.

The following rules may be taken to represent the official, if not the consistent, attitude of our government:

1. In no case is a minister to offer his dwelling as a resort for refugees.

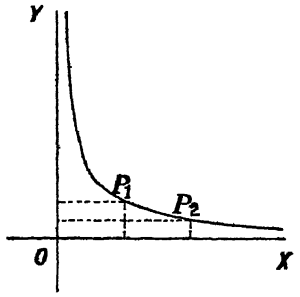
2. If a fugitive, uninvited, applies for protection, it is to be accorded only when his life is in imminent danger from mob violence and only for so long as such imminent danger continues.

3. A minister is bound to refuse asylum to persons fleeing from the pursuit of the legitimate agents of the government, and, in case such persons have been admitted, he must either surrender or dismiss them.

4. A minister is obliged strictly to abstain, except under the conditions and limitations prescribed by rule 2, from receiving or retaining persons who are engaged in political agitation, or who, though not formally accused, inspire the government with distrust.

As ships of war are generally conceded to be exempt from the local jurisdiction of the foreign ports visited by them, it is clearly within the power of commanders of such ships to grant asylum to refugees from that jurisdiction; but it is well settled that "considerations of propriety and good faith require" them "to abstain from abusing the hospitality of the port in which they may be by making their vessels an asylum for offenders against the law." Neither consuls (who are not diplomatic agents) nor merchant vessels, as a rule, enjoy any exemption from the local jurisdiction, and consequently they can assert no claim to grant asylum. Certain immunities which have been conceded to them from time to time have been exceptional in character, and more in the nature of courtesies extended than of rights admitted. The subject of asylum has been fully and learnedly treated by Prof. John B. Moore in his *Asylum in Legations and Consulates* (New York, 1892); and more briefly in Snow's *International Law* (Washington, 1898). Consult also *Moore on Extradition* (Boston, 1891); Wharton's *International Law Digest* (Washington, 1896); and Woolsey's *International Law* (New York, 1899).

**ASYMPTOTE**, ăs'ĭm-tōt (Gk. *ἀσύμπτωτος, asymptōtos*, not falling together, from *ἀ, a*, priv. + *σύν, syn*, with + *πίπτειν, piptein*, to fall). A straight line which a curve approaches nearer and nearer, but does not reach within any finite distance; or, in other words, a tangent to a curve, having the point of tangency at infinity. A clear idea of how a curve may have such a tangent can be procured from one of the well-known laws in physics. According to that law, the greater the pressure exerted upon a gas the smaller the volume it occupies. This law may be presented in geometrical form by drawing two lines, *OX* and *OY* (see figure), perpendicular to each other, and then representing pressures by perpendicular distances from the line *OX* and the corresponding volumes by perpendicular distances from the line *OY*. By joining the series of points, $P_1$ $P_2$, etc., thus obtained, the relation existing between the various pressures and volumes may be graphically shown by a curve called an equilateral hyperbola. The greater the pressure the smaller the volume, and hence the smaller the distance between the curve and the line *OY*. But where will the curve and the lin *OY* be tangent? In other words, where will the distance between them, and hence the volume of gas, become naught? Evidently, at a point infinitely distant from the line *OX*, i.e.,




at a point representing an infinitely great pressure. For under any finite pressure, no matter how great, a gas still occupies a certain definite volume. The line *OY* is therefore, according to the definition, an asymptote of our curve, and so is, for analogous reasons, the line *OX*.

**AS YOU LIKE IT.** A comedy by Shakespeare, founded entirely on Lodge's romance, *Rosalynde*, save for the introduction of Touchstone, Audrey, and Jaques. It was written in 1600, but did not exist in folio until 1623.

**ATA**, ä-tä'. A mixed Malay and Negrito people of Davao district, Mindanao. They do not form a distinct tribe, nor are they of uniform culture. Their language is broken up into many dialects not mutually intelligible. They are not to be confounded with the Aeta. See PHILIPPINES.

**ATACAMA**, ä'tä-kä'mä. A northern province of Chile, bounded by the province of Antofagasta on the north, the Argentine province of Catamarca on the east, Coquimbo on the south, and the Pacific Ocean on the west. Its area, excluding the desert portion, is 30,728 square miles. The surface is stony, scantily watered, and mostly barren, but it is especially rich in minerals. Of these, copper and silver are mined on a large scale and are the most important, commercially, but there are also found considerable quantities of gold, nickel, cobalt, and iron. The salt and saltpetre deposits of the province are almost inexhaustible. Owing to its

important mineral production, Atacama is well supplied with railway lines, which connect the more important mining centres. The first railway built in Chile connects the capital with Caldera, the best ocean port of the country. Pop., 1895, 59,713; 1907, 64,000; 1910 (est.), 65,000. Capital, Copiapó.

**ATACAMA.** That part of the long coast desert of South America extending between the Pacific and the Andes, from the river Loa to Copiapó (23°–27° S. lat.) and embracing the larger part of the Chilean province of Antofagasta and the smaller part of the province of Atacama (Map: Chile, C 9). It rises abruptly from the coast to about 3500 feet, then more gradually to over 13,000 feet, with groups of mountains rising above the high plain, on whose surface are also interspersed small salt lakes and swamps. The surface is strewn with stones and is seldom sandy. The only river from the Cordilleras reaching the sea is the Rio Loa. The region is very rich in minerals, especially in copper and silver and nitrate deposits. The scanty rainfall and the scarcity of fresh water make it almost uninhabitable. No vegetation is found between the elevations of 2000 and 8000 feet except where mountain streams debouch upon the plateau.

**AT'ACA'MAN,** or **AT'ACAME'ÑAN.** The territory of this South American linguistic stock, now represented by a few hundred individuals, of whom hardly any still speak their mother tongue, included the region around Atacama (19°–24° S. lat.) except that portion in the southwest occupied by another stock, the Changoan. This part of the continent is archæologically and ethnologically important as the seat of the ancient "Atacaman culture," recently studied by de Créqui-Montfort, Boman, etc. The surviving Atacamans are to be found at San Pedro de Atacama, etc. Consult Chamberlain in the *American Anthropologist,* vol. xiii, pp. 465–467 (N. S., 1911).

**ATAC'AMITE.** A copper hydroxychloride that crystallizes in the orthorhombic system. It is usually found in confused crystalline aggregates and fibrous or granular massive forms. The lustre is vitrious and the color bright to dark green. As sand it was originally discovered in the Atacama province in northern Chile, whence its name; and it also occurs in Peru, Bolivia, and Australia. It has been found as a crust on the lavas of Vesuvius and Etna in Italy; also in Saxony and in Arizona. The deposits in South America, which contain from 50 to 60 per cent of copper, are regarded as valuable sources of copper, and have been sent to England to be smelted. Atacamite has been ground up in Chile and sold under the name of *arsenillo* as sand for letters. The greenish incrustation found on antique bronze utensils, weapons, and other articles, and commonly known as *ærugo nobilis,* is composed of this mineral.

**ATAHUALPA,** ä'tä-wäl'pä (?–1533). Inca of Peru. He was the favorite son of Huayna Capac, who, upon his death-bed made Atahualpa King of Quito, while Huascar, his eldest son, received Peru (1525). In the spring of 1530 Atahualpa, incensed at Huascar's demand for homage, declared war against him and completely defeated Huascar on the plains of Quipaypan, in the neighborhood of Cuzco, the native Peruvian capital, in 1532, a few months before the arrival of the Spaniards. Huascar was taken prisoner and confined in the strong fortress of Xauxa. Then followed, according to Garcilasso de la Vega, a series of atrocious massacres of all the royal family of the Incas. The extent of these massacres was undoubtedly grossly exaggerated by the surviving relatives of the victims, from whom Garcilasso derived his information; but there seems to be no sufficient reason for doubting that Atahualpa killed all whom he had reason to fear as future rivals. In the meantime the Spaniards had disembarked at Tumbez, and after a perilous march through the unknown country, Pizarro, at the head of his 200 cavaliers, approached the victorious camp of Atahualpa, where he found some 50,000 men assembled. By a stratagem Pizarro obtained possession of the person of the King. Atahualpa was treated with a great show of kindness at first, and more especially when he offered, as a ransom, to fill the room in which he stood with gold as high as he could reach. When Atahualpa's brother, Huascar, who was still a prisoner, heard of this, he offered still more advantageous terms for himself. To prevent this Atahualpa had him secretly assassinated. The golden treasure which was to constitute the ransom of Atahualpa now began to pour in, and at length Atahualpa demanded his freedom. This Pizarro refused to grant and accused Atahualpa of plotting against him. Atahualpa was placed on trial and formally condemned to death upon evidence furnished by an interpreter, who was desirous of possessing one of the wives of the King. He was threatened with burning at the stake as a heretic, but, as he submitted to baptism according to the rites of the Church, he was garroted, Aug. 29, 1533. The principal authority is Garcilasso de la Vega's *Royal Commentaries of the Incas,* trans. by C. R. Markham for the Hakluyt Society (London, 1869–81). Garcilasso's mother was of the Inca blood, or, according to more probable authority, one of the royal concubines.

**ATAKAPA,** ä'tä-kä'pä, or **ATTACAPA** (Choctaw, man-eater). A tribe, now extinct, formerly occupying the western part of Louisiana. They are believed to have constituted a distinct linguistic stock, the Attacapan family, although the language shows some slight correspondence with both Carankawa and Tonkawa.

**ATALA,** ä'tä'lä'. A romance of Chateaubriand, published in the Paris newspaper *Le Mercure de France* in 1801. Atala is the daughter of a North American Indian chief. She falls in love with a prisoner, who is the chief of another tribe, releases him, and flees with him. Having been brought up as a Christian, and sworn by her mother to a single life, she remains faithful to the vow and finally commits suicide in a fit of religious scrupulosity.

**AT'ALAN'TA** (Gk. Ἀταλάντη, *Atalantē*). A heroine in Greek mythology. The tradition recognizes two persons of this name, the Bœotian Atalanta and the Arcadian Atalanta, who are often confounded in the ancient accounts and whom it is not easy to keep apart. 1. The Bœotian Atalanta, daughter of Schœneus, was the most swift-footed of mortals. Being reluctant to marry any one of her many suitors, she imposed upon all who sought her hand the test of a foot-race with herself. If successful, the suitor was to receive her hand, but, if defeated, he was to be put to death. Hippomenes, son of Megareus, came to the contest with three golden

apples, which he had received from Aphrodite. By dropping these successively as he ran along he retarded the course of Atalanta—who stopped to pick them up—and thus won the race and the maiden. Since husband and wife failed to thank Aphrodite, the goddess led them, on their way home, to profane by their love a sanctuary of Cybele. Cybele, angered in her turn, changed them both into lions and yoked them to her chariot. For this version of the story see Ovid, *Metamorphoses*, x, 560–707. 2. The Arcadian Atalanta, daughter of Jasius and Clymene, was, when an infant, exposed on Mount Parthenius by her father, who desired a son. She was suckled by a she-wolf, and afterward rescued and brought up by shepherds. She lived apart from men, the companion of Artemis, skilled with the bow. Many achievements are ascribed to her. She slew the centaurs, Rhœcus and Hylæus, wounded the Calydonian boar, took part in the funeral games of Pelias, and sailed with the Argonauts to Colchis. She finally gave her hand to her suitor Meilanion, by whom she had a son, Parthenopæos, one of the Seven against Thebes.

**ATALANTA IN CAL'YDON.** A play by Swinburne. It is a quaint dramatic experiment, uniting Greek classic form with modern romantic treatment; a poem rather than a play. It appeared in 1864. It is founded on the famous boar hunt of Greek legend, and its choruses are among the author's highest achievements.

**ATTAL'LA.** A city in Etowah Co., Ala., 56 miles northeast of Birmingham, on the Alabama Great Southern, the Louisville and Nashville, the Nashville, Chattanooga, and St. Louis, and the Southern railroads (Map: Alabama, C 1). It is the seat of the Etowah County high school, and has foundry and machine shops, iron mines, compress and storage plant, lumber yards, cooperage, and manufactories of cotton-mill castings, sink brackets, grates, etc. The water works are owned by the city. Pop., 1900, 1560; 1910, 2625.

**AT'AMAN** (Russ. *ataman*, Little Russ. *otamen*, *hetman*, Polish *hetman*, chief of any band or gang. By some explained as an adaptation *via* Poland, of the AS. *heafodman*, Ger. *Hauptmann*, Eng. *headman*, or *hetman*). The title borne by the chief of the Cossack tribes. Formerly the ataman was elected by an assembly of the people and held the power of life and death. Even as subjects of the Czar the atamans held their power until in 1708; after the part played by Mazeppa in the war with Charles XII Peter the Great reduced them to little more than provisional governors. The head of each Cossack army is still called ataman, and an ataman presides over the government of the territory of the Don Cossacks. Since 1835 the title of Chief Ataman has been vested in the Russian heir-apparent. Hetman was also the title given by the Poles to the commander-in-chief of their armies, who was absolute in power during time of war, except when the King took command of the army.

**AT'AMAS'CO LILY.** See Plate of AMARYLLIDACEÆ.

**ATAUL'FUS, AT'AULF,** or **ADOLF,** ȧ'dôlf (?–415). The brother-in-law of Alaric, and his successor as King of the Visigoths (410–415). He assisted Alaric in the sieges of Rome, and after the latter's death went to Gaul, taking as a captive Galla Placidia, sister of the Emperor Honorius, who became his wife in June, 414. He wished to ally himself with Rome, but Honorius was unwilling to form such an alliance. Late in 414 he entered Spain, and in 415 he was assassinated at Barcelona. His last words are said to have been: "If possible live in friendship with Rome, and restore Placidia to the Emperor." Consult Hodgkin, *Italy and her Invaders* (Oxford, 1880–85).

**AT'AVISM** (from Lat. *atavus*, the father of a great-grandfather, an ancestor). A term used in biology to signify the temporary appearance in an individual—plant or animal—of a peculiar character which is not typical of the immediate race or genus, but which is found in allied ancestral races. The term "atavism" is sometimes incorrectly used as a synonym for reversion. Reversion, as employed by paleontologists and students of evolution, refers to the gradual resumption by a race, during the later stages of its existence, of the general form of its ancestors, generally the form of the earliest ancestral members of the race. Abnormal developments are often examples of atavism, as are occasional modern many-toed horses, which recall the foot structure of the extinct three-toed horses of Tertiary time. Good illustrations of atavism are often also furnished by hybrids. See EVOLUTION; HEREDITY.

In sociological literature the term "atavism" is frequently used, in the sense of reversion to more primitive types, to explain criminal instincts and other social-pathological phenomena. In this sense the term is continually used by Lombroso, and by other authors of both the Italian and French schools of criminologists. See CRIMINOLOGY.

**ATAX'IA, LOCOMOTOR.** See LOCOMOTOR ATAXIA.

**ATBARA,** ȧt-bä'rȧ, or **BAHR-EL-ASWAD.** The most northerly tributary of the Nile, rising at the northern end of Lake Tsana, in Abyssinia (Map: Africa, H 3). It flows 800 miles northwest through the Nubian Desert and enters the Nile in lat. 17° N., above Berber. Its most important tributaries are the Bahr-Setit and Mareb. The Atbara is unavailable for navigation, but it is important on account of the large quantity of water it contributes to the Nile during the rainy season. It contributes to the Nile a large proportion of the silt which fertilizes the fields of Egypt. In the dry season the Atbara is almost waterless, except for a few stagnant pools, unfit for drinking.

**ATCHAFALAYA,** ăch'*a*-fȧ-lī'yȧ. A river of Louisiana, having its source near the mouth of the Red River in Avoyelles Parish, and serving as an outlet for the Red and the Mississippi rivers during high water (Map: Louisiana, D 3). It flows south, and passing through Grand Lake, empties into Atchafalaya Bay, Gulf of Mexico. It is about 225 miles long and navigable for small boats for 218 miles.

**ATCHEEN'.** See ACHIN.

**ATCHIEVE'MENT.** See HATCHMENT.

**ATCHINSK,** ȧ-chēnsk', or **ACHINSK.** The chief town of a district in the Yeniseisk government, southern Siberia, on the Chulym River. It is on the road to Tomsk and on the Trans-Siberian Railway, 108 miles west of Krasnoyarsk. Pop., 1897, 6714; 1910, 7000.

**ATCH'ISON.** A city, and the county-seat of Atchison Co., Kans., 49 miles northwest of Kansas City, Mo., on the Missouri Pacific, the Chicago, Rock Island, and Pacific, the Atchison, Topeka, and Santa Fe, and the Chicago, Burlington, and Quincy railroads, and on the Missouri

River (Map: Kansas, G 3). It is finely situated on the "Great Bend" of the Missouri; is the seat of a State soldiers' orphans' home and of Midland College (Lutheran), St. Benedict's College (Roman Catholic), and Mount St. Scholastica's Academy (Roman Catholic). It contains a public library; fine county courthouse and government buildings; Forest, City, and Central parks; a hospital; and a noteworthy bridge across the river, some 1200 feet long. The union station, erected at a cost of about $140,000, is among the prominent buildings of the city. The city's exceptional facilities for transportation by rail and water have made Atchison one of the principal commercial cities of the State; it has an extensive trade in grain, lumber, live stock, fruit, and general agricultural produce, and large wholesale interests in groceries, drugs, and hardware. Manufactures also are of importance, the industrial establishments including large grain elevators, flour, corn, and oatmeal mills, railroad shops, foundries, lumber mills, furniture, broom, and harness factories, carriage works, and brickyards. The government, under a charter of 1881, is vested in a mayor, elected every two years; a municipal council; and administrative officials, appointed by the mayor. The school board is independently chosen by popular vote. Atchison was settled by the pro-slavery party in 1854, during the conflict between that party and the anti-slavery party for the control of Kansas, and was named in honor of Senator D. R. Atchison. It was incorporated in 1858. Pop., 1890, 13,963; 1900, 15,722; 1910, 16 429; 1920, 12,630.

**ATCHISON,** David Rice (1807–86). An American politician. He was born in Kentucky, removed to Missouri in 1830, and practiced law. In 1834, and again in 1838, he was a member of the State Legislature, and from 1843 to 1855 sat in the United States Senate, being president pro tempore in 1846–49 and in 1852–54. By virtue of this office Senator Atchison was for one day legal President of the United States, since General Taylor was not sworn in until Monday, March 5, 1849. A slave-holder himself, he soon became conspicuous as a pro-slavery leader in the debates over the organization of Kansas and Nebraska, and in 1854 fought with Douglas for the passage of the Kansas-Nebraska Act, which involved the repeal of the Missouri Compromise of 1820. Returning to western Missouri in 1855, he there took an active part in the struggle (1856–57) between the pro-slavery and "free state" parties for the control of Kansas, though for the most part he discountenanced violence and bloodshed.

**ATE,** ā'tē (Gk. Ἄτη, *Atē*, bewilderment, infatuation, from *ἀάειν*, *aaein*, to hurt, damage, infatuate). The personification, in Greek mythology, of the blindness which leads men to ruin, called sometimes daughter of Zeus and Eris (Strife). She tricked Zeus into the oath which made Hercules subject to Eurystheus, and was in consequence cast forth from heaven; on earth thenceforth she led men into evil. Ate is seldom clearly personified. Even in the legend of her deception of Zeus we have scarcely more than allegory, and even in Greek tragedy Ate is rarely more than a quality.

**ATELIERS NATIONAUX,** ȧ'te-lyā' nȧ'-syō'nō'. See National Workshops.

**ATELLA.** See Atellanæ.

**ATELLANÆ** (Lat. *Fābulæ Atellanæ*, the Atellan fables, farces; also styled *Ludi Osci*, the Oscan plays). A kind of popular drama in Rome, introduced, tradition said, from Atella, a town in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old Fabulæ Atellanæ were still retained as interludes and after-pieces. The Maccus (Fool) and the Bucco (Fat-Chaps) of the Fabulæ Atellanæ may be considered the origin of the modern Italian *arlecchino* (harlequin), and other characters of the same stamp. They were the favorite characters and, in the view of some, spoke the Oscan dialect, exciting laughter by its quaint, old-fashioned words and phrases. It is, however, not likely that the Oscan speech was used in them, at least to any extent; rather the Atellanæ ridiculed country life and manners. Other stock characters in the Atellanæ were Pappus (Papa, Daddy) and Dossennus (Sharper, Trickster). The Atellanæ were neither so dignified as the *comœdia palliata*, nor so low as the *comœdia tabernaria*, but indulged in a kind of genial and decent drollery. The caricature was at first always pleasant, and, though quizzical, did not lapse into the obscenity which characterized the *mimi*. Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing caste, were allowed to take part in the Atellanæ. In Sulla's time the Atellanæ made an approach to literary form, in the writings of Pomponius and Novius. A few fragments of these popular farces have been collected by Ribbeck in his *Comicorum Romanorum Fragmenta* (Leipzig, 1898). Consult also Munk, *De Fabulis Atellanis* (Leipzig, 1840).

**A TEMPO,** ä tĕm'pō (It. to, or in time). A term used in music to denote that, after some short change in the time, the performer must return to the original tempo.

**ATEUCHEUS SACER,** ȧ-tū'kŭs sā'sẽr. See Scarabæus.

**ATH,** ät, or **AATH.** A town in the province of Hainault, Belgium, situated on the navigable Dender, 14 miles northwest of Mons (Map: Belgium, B 4). It has a hospital and college, and important manufactures of linen, calico, lace, gloves, cutlery, etc., and carries on a brisk general trade. There are many lime kilns in the vicinity. Pop., 1890, 9900; 1900, 11,100; 1910, 11,108.

**ATHABASCA,** ăth'ȧ-băs'kȧ (N. Amer. Indian, place of hay or reeds). Formerly a district in Canada, formed in 1882 out of the Northwest Territories, and enlarged in 1895, so as to contain 251,300 square miles, including 11,800 square miles of water area. The district lay between lat. 55° and 60° N. and long. 100° and 120° W. It was bounded on the north by the former district of Mackenzie, on the east by the former district of Keewatin, on the south by the former districts of Saskatchewan and Alberta, and on the west by the province of British Columbia. It is a part of the great American Plain, and only in the southwest corner, where it approaches the mountains of British Columbia, does it attain any considerable elevation. Much of its surface, however, is decidedly broken and hilly. The greater portion drains northward into the Mackenzie River system. The western half is crossed by the Athabasca and Peace rivers. There are numerous lakes, of which Reindeer Lake, in the east, and Athabasca, in the north, are very large; the former is included in the province of Saskatchewan, while the latter is divided between Saskatchewan

and Alberta. The climate is subject to great extremes of heat and cold, but is clear and bracing. There is little rain or snow, but the rainfall is greatest when most needed, during the growing summer months. In the west the soil is highly fertile, and wheat, potatoes, and other of the hardier varieties of cereals and vegetables can be successfully raised. In the east the soil is rocky and sandy and less fertile. Salt and gypsum are found in the Slave River region. The inhabitants are mostly Indians and half-breeds, who live by hunting, the product of the chase constituting almost the only revenue-producing resource of the district. Dunvegan, in the southwest, is the principal settlement. In 1905 Athabasca ceased to exist as a political division, the western part falling to the new province of Alberta, the central part to the new province of Saskatchewan, and the extreme east to the Northwest Territories; the latter part in 1912 was included in Manitoba. For a further description, see ALBERTA; SASKATCHEWAN.

**ATHABASCA, or ELK, RIVER.** A river in the northwest of Canada, included in the great basin of the Mackenzie (Map: Canada, H 5). It rises near Yellowhead Pass in the Rocky Mountains. Its general course is east and then north to Athabasca Lake, from which it emerges and unites with the Peace River to form the Slave River. Its length is 765 miles, its drainage area 58,910 square miles, and its most important tributaries are the McLeod, Pembina, and Lesser Slave rivers.

**ATHABASCA LAKE.** A Canadian lake in the northern part of Alberta and Saskatchewan (Map: Canada, J 5). It is traversed by the parallel of 59° N. and by the meridian of 110° W.; length, 195 miles; average width, 20 miles; area, 3085 square miles. Its principal feeder is the Athabasca River.

**ATHABASCA PASS.** A defile of the Canadian Rocky Mountains between Mounts Brown and Hooker, which crosses the boundary between Alberta and British Columbia (Map: Northwest Territories, F 4).

**ATHAL'ARIC** (516–534). King of the Ostrogoths. He was selected by his grandfather, Theodoric the Great, as his successor, and upon the death of Theodoric was recognized as such by the Goths and Romans. In consequence of dissipation, however, he died at an early age.

**ATH'ALI'AH** (Heb. Yahwe is powerful). The daughter of Ahab (2 Kings viii. 18), King of Israel, and Jezebel, who married Jehoram, King of Judah (ib. viii. 26). After the murder of her son, Ahaziah (2 Kings ix. 27), who succeeded Jehoram, but reigned for only one year, she paved her own way to the throne by a general slaughter of her grandchildren, Joash alone escaping through the intervention of Jehosheba, the daughter of Jehoram. This occurred c.842 B.C. The young prince thus rescued was privately educated in the temple, and, after Athaliah had reigned six years, the high priest, Jehoida, succeeded by a carefully contrived plan in placing Joash on the throne (c.836 B.C.). Athaliah, hearing the noise attending the coronation, hastened to the temple, where the people were shouting "God Save the King!" As she looked around in astonishment on the young King, whom she had supposed to be dead, surrounded by priests, Levites, rulers, captains, and a rejoicing multitude, she "rent her clothes, and cried, 'Treason! treason!'" By the command of the high priest she was led out of the temple and slain in the gateway of the palace. The house of Baal, with its altars and images, was broken down. This narrative (2 Kings, xi.; 2 Chron. xxii. and xxiii.) is the subject of Racine's drama *Athalie*.

**ATHALIE,** ȧ'tȧ'lē' (Fr. Athaliah). The title of a tragedy by Racine, and his last play (1691). Founded upon the story of Athaliah in 2 Kings, it was written at the suggestion of Madame de Maintenon, who desired for her protégées, the girls of her school at Saint Cyr, a play in which there should be no word of sexual love. The dramatic quality of the play is no less striking than its religious fervor, and the tragedy may well have given a fit opportunity to Rachel's emotional gifts. If not the poet's masterpiece, it is perhaps inferior only to his dramas *Andromaque* and *Phèdre*.

**ATH'AMAS.** The son of Æolus, and ruler of Orchomenus in Bœotia. At first he married the cloud goddess Nephele, who bore him Phrixos and Helle, but he was abandoned by her on account of his love for the mortal Ino, daughter of Cadmus. By Ino he was the father of Melicertes and Learchus, the latter of whom he slew in a fit of madness. Thereupon Ino cast herself into the sea with Melicertes and was changed into the sea goddess Leucothea, while Melicertes became Palæmon, a divinity of sailors. Athamas fled to Thessaly, where, presently purged of his guilt, he married Themisto. The story of Athamas was much used by the Greek tragic writers.

**ATHAN'AGILD** (?–567). King of the Visigoths of Spain. In 554 he led the uprising against King Agila (549–554) and called the Byzantines of North Africa to his aid. The Emperor Justinian also lent his aid to Athanagild by sending to Spain an army under Patricius Liberius, which conquered the principal seaports on the southeastern coast of the peninsula. Agila was defeated at Seville and murdered by his followers, and Athanagild succeeded to the throne. He built the churches of St. Justa and St. Rufina at Toledo.

**ATHAN'ARIC** (?–381 A.D.). A ruler, with the title of judge, of the Western Goths (Visigoths), whose settlements lay on the north bank of the lower Danube. Since he took advantage of the weakness of the Roman Empire when the imperial armies were engaged in suppressing the rebellion of Procopius, war was declared against him by the Emperor Valens. Athanaric acted strictly on the defensive during two campaigns, in which the Romans gained no advantage over him; but in the third year of the war (369 A.D.) he hazarded a general battle, and was defeated, whereupon he sued for peace, and, with that object, had a conference with Valens in a boat on the Danube. After peace was concluded Athanaric was occupied in settling dissensions arising out of the Arian controversy, which then agitated his people; he was a relentless foe of all Christians. When the first advance of the Huns on Europe alarmed the Gothic nation, Athanaric attempted to secure the eastern borders of his kingdom; but the Huns forced the passages of the Dnieper, defeated the Goths, and advanced in great force into the plains of Dacia. When, in 376, the Western Goths were received by the Romans as allies, and had settlements granted them on the south of the Danube, Athanaric, with a part of his people, refused to accompany them, removing to the west and fortifying himself against the new enemy. In 380, however, banished by his followers, he accepted the hospitality of the Empire, and re-

moved to Constantinople, where he was cordially and honorably received by the Emperor Theodosius. Fourteen days later he died. Consult Hodgkin, *Italy and her Invaders*, vol. i (Oxford, 1880), *and The Cambridge Mediæval History*, vol. i (New York, 1911).

**ATHANASIAN** (ăth'a-nā'zhan) **CREED, THE.** Often called the Quicunque, from its first Latin word. The longest of the three so-called ecumenical creeds and the latest in time of composition. (See CREEDS AND CONFESSIONS and NICENE CREED.) It was long supposed that the Athanasian Creed was the work of the saint whose name it bears. Mediæval legend said that Athanasius wrote it while in exile in Rome, during the episcopate of Julius I (337–352), but since the seventeenth century this theory has been shown to be untenable. Among the arguments against it are these: The creed was written in Latin, whereas Athanasius spoke and wrote Greek; it is nowhere mentioned by Athanasius, or by any of the other Greek fathers of the century after his death; it omits certain forms of statement which Athanasius was specially interested in maintaining, and includes others which were not formulated until a later time; and it appears first in the West, and never received the sanction of the Eastern church at all. On the other hand, a study of the contents of this so-called creed, and a careful comparison of other documents, make it appear probable that what we have is in fact not a creed at all, but rather an explication, or setting forth, first, of the Catholic doctrine of the Trinity, and, secondly, of the person and work of Christ. The creed thus falls into two main divisions, the former clearly depending upon the teaching of St. Augustine, the latter upon the Christology of Chalcedon (q.v.). It may have been, wholly or in part, a sermon on the creed, such discourses being very common at that age of the Church. And indeed Hincmar of Rheims (ninth century) expressly calls this creed *sermonem Athanasii de fide*. Or it may have been regarded as a sort of hymn or chant, to be used in public worship, like the Te Deum. We know that in the Middle Ages the Quicunque was actually recited at Prime by the monks in the monasteries of southern Gaul. This liturgical use of our symbol can be traced as far back as the Carolingian period, and the formula itself is doubtless still older. It is apparently referred to in the acts of the Synod of Autun (c.670 A.D.), and most modern scholars are inclined to place its composition, or compilation, in the sixth century.

Striking parallels, amounting sometimes to verbal identity, are found to the Athanasian Creed in a sermon falsely attributed to Augustine, but really perhaps by Cæsarius of Arles (ps. Augustine, *Sermo* 244), in the *Commonitory* of Vincent, of Lerins (434 A.D.), and in Augustine's treatises on *The Trinity* and *Christian Doctrine*, which are still older. At least one of the characteristic phrases of this creed was current in the West early in the third century (Tertullian, *Adv. Prax.*, 13, "The Father is God, and the Son is God, and the Holy Ghost is God, and each is God"). It would appear, therefore, that we have to do, not with the work of any single writer, but with a document which was produced gradually, perhaps from various sources, but worked into a unity under Augustinian influence, and reaching its present form by the sixth century, probably in southern Gaul or north Africa.

At the beginning of the Athanasian Creed, and also at the end of each of its two divisions, occur damnatory clauses, pronouncing eternal doom upon all who do not accept the Catholic faith as here set forth. So far as doctrine is concerned, the creed agrees with the theology of western Christendom, including Protestantism. But objection has often been made to the way in which the faith is here expressed, especially to its rigid form, its highly artificial refinements, its mathematical precision, the minute detail arising from its great length, and the damnatory clauses. Most Protestant churches do not make use of this creed, although it is retained in the English Book of Common Prayer and is appointed to be read in that church on thirteen special days of the year. The American Episcopal church has dropped it entirely.

For the text of the Athanasian Creed, consult the English Prayer Book, and Philip Schaff, *Creeds of Christendom*, vols. i, ii (New York, 1884). Consult also: A. E. Burn, *The Athanasian Creed and its Early Commentators* (Cambridge, 1896); G. D. W. Ommanney, *Critical Dissertation on the Athanasian Creed* (Oxford, 1897).

**ATHANASIUS,** ăth'ă-nā'zhĭ-ŭs, SAINT (Gk. *Ἀθανάσιος, Athanasios*) (c.293–373). The father of Greek orthodoxy, Bishop of Alexandria, and the most eminent theologian of the fourth century. He was probably born in Alexandria, and died there. His parents are said to have been Christians. We know little about his youth, except that he was well educated and brought up for the service of the Church. Rufinus tells us that in early boyhood Athanasius played at being bishop and baptized some of his mates according to the rules of the Church, and that the bishop afterward recognized their baptism as valid; but this story rests upon no sufficient evidence. Athanasius began to serve the Church as reader, and was advanced to the office of deacon before the beginning of the great theological struggle which led up to the Council of Nicæa (325), where he appears as an opponent of the presbyter Arius, who also lived in Alexandria. His life is intimately connected with the progress of the Arian controversy, and he was by far the most formidable antagonist whom that heresy encountered. For many years it was "Athanasius contra mundum," but his great ability and perseverance gained the victory in the end. (For particulars respecting this struggle, see NICÆA, COUNCIL OF; ARIUS.) Athanasius advocated the famous *homoousion* doctrine, which was that the Son of God is of the same essence or substance with the Father, whereas Arius maintained that the Son was of like substance with the Father, but the first of creation, and more than man. All the Trinitarian and Christological speculations of the fourth and fifth centuries have their roots in this controversy.

Athanasius became Bishop of Alexandria, probably in 326, and his episcopate lasted until his death, 47 years afterward. At this time Alexandria was not only one of the leading cities of the Empire, but also one of the most important in the Church. For more than a century the greatest theologians had worked and taught here, and here, too, divergences from Catholic orthodoxy were by no means rare. During the progress of the Arian controversy politics mingled with theology, and each side labored to win Imperial favor. The Arian party was influential at court and very active. Five times

Athanasius was sent into exile, and more than one-third of his long episcopate was spent away from his see. Almost from the first, charges of immorality, sacrilege, sorcery, treason, and even murder were brought against him by his enemies; but in every case the verdict of history has pronounced him innocent. A grossly partisan synod at Tyre (335) condemned him, and the outcome was his first banishment, lasting two years, which he spent at Treves. He was pardoned after the death of Arius, and returned to Alexandria amid the acclamations of the people (337). The Emperor Constantius banished him again in 339, and this second exile extended over seven years. Athanasius sought refuge with Julius, Bishop of Rome, where he was well received, and where, according to an unreliable tradition, he is said to have written the Athanasian creed (q.v.). Leaving Rome, he visited Gaul, Dacia, Aquileia, and Antioch. In 346 he was permitted to return to his see, and the joyful people streamed forth to meet him "like another Nile." By favor of the Emperor Constans Athanasius now enjoyed 10 years of comparative quiet; but in 356, owing to the renewed ascendency of the Arian party, who had gained control of all the churches in Alexandria, he was once more compelled to seek safety in flight. For six years he dwelt among the Egyptian hermits, or concealed himself in the neighborhood of the capital, where he could secretly watch the fortunes of his church. These years were fruitful in literary labor, and at the same time they gave him a more intimate knowledge of the monastic life. Athanasius was the first episcopal patron of the monks, and it is largely through him that the Western church came to know of the Egyptian hermits. After Julian's accession a policy of religious toleration was inaugurated, and Athanasius was recalled. But the Emperor had a personal falling out with the Bishop the same year (362) and issued a special edict against him, so that he fled to Thebaïs, where he remained about 18 months. His fifth and last exile lasted only four months and brings us down to the year 366. Seven years of life remained to the aged Bishop, and these were spent in quiet labor at his post, and in enjoyment of the honors his fidelity had earned. The theological battle was practically over, and the victory rested with the cause of Nicene orthodoxy. Athanasius's disciples, especially Basil the Great and the two Gregories, were instrumental in securing the final verdict in its favor at the second Ecumenical Council at Constantinople (381).

Athanasius was a voluminous writer. His works are chiefly controversial and dogmatic, though some are exegetical and pastoral. Highly valuable to the historian are such works as the *Discourses against the Arians*, the *History of the Arians*, the *Apology against the Arians*, and *On the Decrees of the Nicene Synod*. The *Life of St. Anthony* purports to describe that famous hermit, but it is full of legendary material. A series of *Festal Epistles*, relating to the celebration of Easter, contains much valuable material of various kinds; e.g., the Thirty-ninth Epistle, for the year 367, gives a very important list of the canonical books of the Bible.

The Benedictine edition of Athanasius's works appeared in Paris (3 vols., 1698). Migne's *Patrologia Græca*, vols. xxv–xxviii (Paris, 1857), is more nearly complete, but has the usual faults of that collection. The *Festal Epistles* were edited by Cureton (London, 1848). An English translation of the "Historical Tracts" and "Treatises in Controversy with the Arians" may be found in *The Library of the Fathers* (Oxford, 1843). Selections from his writings, including all the most important, and also his letters, are translated by Archibald Robertson, who furnishes elaborate prolegomena discussing "The Life and Theology of Athanasius," in the *Nicene and Post-Nicene Fathers*, 2d series, vol. iv, ed. by Schaff and Wace (New York, 1892). Consult also William Bright, *Lessons from the Lives of Three Great Fathers* (London, 1890); F. W. Farrar, *Lives of the Fathers*, vol. i (New York, 1889); W. Cave, *Lives of the Fathers*, vol. ii, ed. by Cary (Oxford, 1840); and the article on Athanasius in Smith and Wace's *Dictionary of Christian Biography*. For the teaching of Athanasius, consult: Harnack, *History of Dogma*, vol. iv (Boston, 1898), and Fisher, *History of Christian Doctrine* (New York, 1896); Bishop, *Development of the Trinitarian Doctrine in the Nicene and Athanasian Creed* (New York, 1911); Simpson, *Athanasian Warning* (New York, 1911); Taylor, *Athanasian Creed in the Twentieth Century* (New York, 1911); Burn, *The Athanasian Creed* (London, 1912).

**ATH'APAS'CAN STOCK.** One of the most important and most widely extended linguistic stocks of North America, having its territorial and tribal nucleus along the Yukon and Mackenzie rivers of Alaska and British America, but extending in detached tribes on both sides of the great divide southward almost to central Mexico. The line of migration has evidently been by successive conquests from north to south, the original tribes everywhere giving way before the more warlike Athapascans. Tribal characteristics and habits are as various as might be expected in a race scattered from the Arctic zone to the tropics. Among the more important tribes may be named the Chippewayan, Kuchin, Taculli, Sarsi, Hupa, Navajo, Apache, Jicarilla, Mescalero, and Lipan. See these tribal names for detailed information.

**ATHARVA,** â-t'här'vâ, or **ATHARVAN,** â-t'hür'van, or **ATHARVAVEDA,** â-t'hür'vâ-vā'dâ. The name of the fourth Veda.

**A'THEISM** (Gk. *á, a,* priv. + *θeós, theos,* god). The doctrine that there is no God. It is to be clearly distinguished from agnosticism (q.v.), which is a profession of ignorance about God, not a denial of His existence. Many of those charged with atheism have merely rejected some particular form of popular belief in the gods. The early Christians were called atheists because they denied the gods of the Greeks and Romans, and Christians themselves have sometimes used the term with little more justification. Voltaire and Thomas Paine are instances of men widely denounced as atheists, who were not atheists, but deists (see DEISM). Real atheism, however, has appeared in almost every highly developed civilization. Its cause is usually new philosophical or moral ideas, which seem, at least for a time, to be incompatible with current theistic belief. Often it voices a protest against an unworthy conception of God. In India the Sankya philosophy, which is one of the great systems of Hindu thought, Buddhism, and Jainism are atheistic, each arguing against an eternal Creator on the ground that the conception is both needless and illogical. Atheism appeared occasionally in Greek and Roman thought, though some of those charged with it, as Protagoras, were really agnostics. In the

modern world it arises from a belief that the arguments to prove a God are not sufficient to compel acceptance; from materialism, the belief that no power except that of physical forces is needed to explain the universe; and from sensationalism, the belief that all ideas are the result of sensations, and that we can know nothing about the Absolute or Infinite. The last position leads more logically to agnosticism. In the eighteenth century atheism gained some followers in France, and later, in Germany. The most famous exponents of it were La Mettrie, Holbach, Feuerbach, and Carl Vogt. In modern thought Comte, from the philosophical side, and Haeckel, from the scientific, have put forward systems of thought essentially atheistic, in that they account for the universe without the hypothesis of a self-existent and self-conscious God. Atheism is not necessarily irreligious. On the contrary, Buddhism, Jainism, and the Positivism of Comte are organized religions. For modern atheism, consult Flint, *Anti-theistic Theories* (Edinburgh, 1879); Otto, *Naturalism and Religion* (London, 1907).

**A'THEIST, THE.** Otway's last play, being a continuation of *The Soldier's Fortune*, produced at Dorset Gardens in 1684, with Betterton as Beaugard and Mrs. Barry as Porcia. Its plot, which is extremely involved, is drawn from a French novel, *The Invisible Mistress*, by Scarron. It was dedicated to Lord Elande, son of the Marquis of Halifax.

**ATHEIST'S TRAG'EDY, THE.** One of Cyril Tourneur's best-known plays. It bears the subtitle of *The Honest Man's Revenge*, and, when published in 1611, also bore the note, "As in divers places it hath often beene acted." It was probably written in 1600. The plot, grotesque and crude, is drawn from the *Decameron*. As poetry, it contains several passages of no little imaginative power.

**ATH'ELARD.** See ADELARD.

**ATH'ELING** (AS. *Ætheling;* Ger. *Adel*, nobility). Among the Anglo-Saxons a general designation for a noble. In the ninth and tenth centuries it was often restricted to members of the royal family and sometimes to the heir to the throne.

**ATHELNEY,** ăth'el-nĭ, **ISLE OF** (AS. *Æthelinga*, princes' + *ig*, island). An island in the midst of a marsh, at the junction of the rivers Tone and Parret, in the middle of Somersetshire, England. Here Alfred established his camp as a rallying point against the Danes, and later (in 888) founded a Benedictine abbey, now entirely gone. Athelney is the scene of Alfred's reputed adventure with the cakes. The "Alfred Jewel" was found there in 1693. See ALFRED.

**ATH'ELSTAN** (AS. *Æthele*, noble + *stān*, stone), or **ÆTHELSTAN** (c.894–940). The grandson of Alfred the Great and the first monarch who took the title of King of England. He was crowned at Kingston, in Surrey, in 924 or 925, and seems to have possessed both great ambition and high talent. It is supposed that his design was to unite in subjection to his single sway the entire island of Britain. On the death of Sihtric, King of Northumbria, who had married one of his sisters, Athelstan took possession of his dominions. The other kings of the island submitted to him, and he styled himself *Rex totius Britanniæ*. A league, composed of Welsh, Scotch, and English, was formed against him. A fierce and decisive battle was fought at Brunanburh, in 937, in which the allies were utterly defeated and which became famous in Saxon song. After this the reputation of Athelstan spread to the Continent. Five of his half-sisters married continental nobles, viz., Otho the Great, Charles the Simple, Hugh the Great, Louis, King of Arles, and a German noble. At home he exhibited a deep interest in the welfare of his people, improved the laws, built monasteries, and encouraged the translation of the Bible into the vernacular. He died at Gloucester, Oct. 27, 940. Consult Freeman, *Old English History* (London, 1869) and *The Norman Conquest* (London, 1885).

**ATH'ELSTANE.** A character in Scott's *Ivanhoe*. Although of gigantic strength, he is nicknamed "The Unready," because of his phlegmatic temperament. He is a suitor for the hand of Rowena, but in the end renounces his pretensions in favor of Ivanhoe. His title is "Thane of Coningsburgh."

**ATHE'NA.** See MINERVA.

**ATH'ENÆ'UM** (Lat. *Athenæum*, from Gk. *Ἀθήναιον, Athēnaion*, temple of Athene). The name applied in general to temples dedicated to the tutelary goddess of Athens, though more particularly used to designate one of these temples in Athens where poets and men of letters were accustomed to meet and read their productions. (See ATHENE, TEMPLE OF.) At Rome the Athenæum was a celebrated institution of learning, founded by Hadrian about 135 A.D., and developed by those of his successors who were interested in literature and education. The building was in the form of a theatre, in which poets and rhetoricians read their productions, delivered lectures, and held recitations. In time salaried professorial chairs were attached to the Athenæum, which thus became a university like that at Alexandria. In this form it survived until the fifth century. Similar institutions, bearing the same name, were established in Lyons, Marseilles, and other provincial centres. The term is applied also in Belgium and Holland to schools of a grade below the universities. In modern times the term has become a very general designation for literary or scientific clubs and societies, or for the buildings in which they meet, and has been adopted as the title of a number of important literary journals, notably of one in Paris and of one in London. The best-known club is that founded in London in 1824. Its members are elected from among men "of distinguished eminence in sciences, literature, or the arts, or for public service." The club is situated at 107 Pall Mall.

**ATH'ENÆ'US** (Gk. *Ἀθήναιος, Athēnaios*). A Greek writer who flourished in the latter half of the second and the early third century A.D., born at Naucratis, in Egypt. He lived first at Alexandria and afterward in Rome; but we possess no further details of his life. His great work was the *Deipnosophistæ* ('The Dinner of the Learned'), in 15 books. Of this the first two and parts of the third, eleventh, and fifteenth have come down to us only in an abridged form; the remaining books are complete. After the model of Plato's Symposium, Athenæus relates to his friend Timocrates the table talk at a dinner given by one Larensius, to which 29 guests were invited. Among them were jurists, poets, grammarians, philosophers, orators, physicians, and musicians. The work, as a matter of fact, consisted of extracts from an enormous

number of books (2500, by 800 writers) which are introduced into the imaginary conversation. Almost every possible subject, from cookery to grammar and literary criticism, is discussed, but the author is especially fond of scandal and of cookery. The work has not a single gleam of genius, the dialogue is prolix and lumbering; but as a storehouse of miscellaneous information the book is invaluable. The date of composition is after 192 A.D., for the Emperor Commodus, who was murdered in that year, is ridiculed in it; according to Kaibel, after 228. The best edition is by Kaibel (1887–90). The work was also edited by Schweighäuser (1801–07), Dindorf (1827), Meineke (1858–67), and was translated by Yonge in Bohn's Classical Library (1854).

**ATH'ENAG'ORAS** (Gk. *Ἀθηναγόρας*). An early Christian philosopher, who taught first at Athens and afterward at Alexandria. He is one of the oldest of the apologetical writers, and is favorably known by his *Legatio pro Christianis*, which he addressed to the Emperor Marcus Aurelius, about the year 177 A.D. He therein defended the Christians against the monstrous accusations of the heathens—viz., that they were guilty of atheism, incest, and cannibalism. His work is written in a philosophical spirit and is marked by great clearness and cogency of style. We likewise possess a valuable treatise of his on the resurrection of the dead. Consult the English translation in *Ante-Nicene Christian Library*, vol. ii, pp. 129–162 (New York, 1867).

**ATH'ENA'IS.** See EUDOCIA.

**ATHENE**, ȧ-thē'nē. See MINERVA.

**ATHENE**, TEMPLE OF. 1. The name long given to a famous Doric temple at Ægina, of which 22 columns remain. The sculptures of the pediment, representing a contest of Trojans and Greeks, are among the Æginetan Marbles at Munich. In recent years scholars have inclined to believe that the temple was built rather in honor of Aphæa. (See ÆGINETAN SCULPTURES.) 2. An old temple at Athens, situated between the Parthenon and the Erechtheum, the foundations of which were identified in 1885 by Dörpfeld, who has based on them a reconstruction of the temple. (See ATHENS.) 3. An archaic Doric temple dating from the sixth century B.C., at Syracuse, now a cathedral. 4. See PARTHENON.

**ATHENE NI'KE**, TEMPLE OF. See NIKE APTEROS, TEMPLE OF.

**ATHENE PAR'THENOS** (Gk. *Ἀθήνη παρθένος*, Athene, the Virgin). A small, inferior copy of the great chryselephantine statue of Athene. It is in the possession of the National Museum at Athens. The original was the work of Phidias for the Parthenon.

**ATHE'NIS.** See BUPALUS.

**ATHEN'ODO'RUS** (Gk. *Ἀθηνόδωρος, Athēnodōros*). 1. The Rhodian sculptor of the first century B.C., who, with two others, produced the famous "Laocoön." (See LAOCOÖN; GREEK ART.) 2. Surnamed *Cananites*, from *Cana*, near Tarsus, his birthplace, son of Sandon (c.74 B.C.–8 A.D.). A Stoic philosopher, the instructor of Augustus when the latter was a boy at Apollonia; he came afterward to Rome, where the Emperor favored him highly, and made him tutor of the young Tiberius. His influence was great at court, and he was very free-spoken; he is said to have advised Augustus to repeat the alphabet whenever he felt himself giving way to anger. He was on friendly terms, too, with Cicero and Strabo; the latter declares that he was a learned scientist. In his old age Athenodorus returned to his native town, Tarsus, where he died. 3. A Stoic philosopher, of Tarsus, surnamed Cordylion (c.110–40 B.C.). As director of the library at Pergamum, he sought to purify Stoic writings by cutting out of them passages which did not meet his views. From 70 B.C. he lived at Rome in the house of Cato Uticensis.

**ATH'ENS** (Gk. *Ἀθῆναι, Athēnai*, usually derived from the name of the goddess Athene). The capital of the kingdom of Greece and of the nome of Attica; situated in lat. 37° 58′ N., and long. 23° 44′ E., on the southwest coast of Attica, less than 3 miles from the Saronic Gulf at the nearest point, and about 4½ miles from the harbor of Piræus, in the plain bounded on the northwest and north by Mount Parnes, on the northwest by Mount Pentelicon, on the east by Mount Hymettus, on the south by the sea, and on the west by Mount Ægaleos (Map: Greece, E 4). It is 350 feet above sea level and has a moderate climate, the mean temperature ranging from 46° F. in January to 81° in July. The cluster of houses at the foot of the Acropolis on the site of ancient Athens forms the inner city, with narrow, crooked streets; and outside of this the Neapolis, or new city, extends in a semicircular arc, which is regularly laid out and divided into six districts. It is connected with the older portion by Hermes and Æolus streets, the main business thoroughfares, which intersect at Constitution Square, the site of the royal palace and gardens. In the modern section the Square of Harmony (Place de la Concorde) forms a centre from which wide boulevards radiate in various directions, the most important of which are Piræus Street, Athens Street, Stadion Street, and University Street, the last two ending in Constitution Square. On the two avenues last mentioned stand the government offices and the buildings of the archæological colleges, of the Academy of Sciences, of the National Library, and of the National University. Other important modern structures are the Royal Palace, erected from 1834 to 1838, situated amid magnificent gardens, the House of Parliament, Palace of Justice, the Polytechnic Institute, National Archæological Museum with its priceless collections, the Metropolitan, Roman, and Anglican churches, and extensive cavalry barracks. For illustrations of the architectural features of Athens, see ARCHITECTURE.

The government of the city is administered by a mayor, or *demarchos*, chosen by popular vote every four years, together with a council of 18 members, which has jurisdiction over the suburbs of the parish. There is a municipal fire department, but the police is under the control of the central government. The city owns its gas and electric plants as well as the water works, which include the ancient aqueduct of Hadrian, but the water supply is so scanty that the inhabitants are obliged to supplement it by purchase from water-carriers. Street cars traverse the city in every direction, and railroads from all parts of Greece converge here. A suburban line runs to the bathing resort of Phaleron, close to the port of Piræus. Athens is the seat of several foreign consulates, including one of the United States. It is the financial centre of Greece, although it does little manufacturing and trades only in imports for its own consumption. It is the seat of a Greek Metropolitan. The population has been steadily increasing in the

last quarter of a century. It numbered 66,834 in 1879, 107,251 in 1889, 111,486 in 1896, exclusive of the suburbs, 167,479 in 1907; 1920, 300,704.

**Education.** There are primary, secondary, normal, technical, and industrial schools. The National University, founded in 1837 and named in honor of King Otho, received its present title after his abdication. Its income is about $80,000, the number of students about 2500. The faculties comprise theology, law, medicine, philosophy, and mathematics and physics. The university has a number of museums, laboratories, and a library, which is also the National Library, of 250,000 volumes, 2300 MSS., and 200,000 historical documents. Besides this there are the library of Parliament, with 160,000 volumes, the National Museum, and that of the Acropolis.

But to foreigners the chief educational importance of Athens centres not in the university, but in the various schools established there by other nations, for study of Greek archæology. Of these the American School of Classical Studies is of especial importance. It was founded by the Archæological Institute of America and opened in 1882. It is supported by regular contributions from American universities and colleges and by gifts, and has a permanent director and secretary and a professor of Greek language and literature chosen annually from among the institutions which support it. It has three scholarships, two for men and one for women. Its students are in the main drawn from American colleges and universities. Besides instruction it devotes much time to investigation. Its organ is the *American Journal of Archæology*. Like this in many respects is the French School at Athens, founded in 1846, which is supported by the State and controlled by it, with the assistance of the Academy of Inscriptions and Belles-Lettres. It is managed by a director and associates. The British School at Athens was founded in 1886, is supported partly by the government and partly by contributions from the universities of Oxford and Cambridge, the Society for the Promotion of Hellenic Studies, and private subscription. It is under the control of a managing committee in London and a director, assistant director, and secretary in Athens. Like the American School, it devotes itself to both teaching and excavation. Of equal importance is the Royal German Archæological Institute, founded in 1874, supported by the government and under the control of a directorate in Berlin, represented by secretaries both in Athens and in Rome. The work of this institute has been of an unusually high character. All these organizations issue monographs and proceedings.

**History.** The early history of Athens is involved in obscurity. The Athenians themselves claimed to be *autochthones*, and there can be no doubt that Attica was outside of the great waves of migration that swept over northern Greece and the Peloponnesus. In all probability the early inhabitants of Athens were a people made up of an original stock which occupied the place from Minoan times at least and an admixture of incomers from Ionia. These newcomers seem to have been responsible for many of the important changes which subsequently took place in Attica. In the earliest times Athens, or Cecropia, was only one of a number of petty states, but tradition said that it became the capital under Theseus, who united the whole of Attica under his rule. Theseus may be mythical, but it is certain that Athens early became so thoroughly the capital of the country that only Eleusis preserved the memory of independence. Like all the early states, Athens is said to have been ruled by kings, of whom the last was Codrus. The rule of archons, chosen for life, seems to represent the limitation of the royal power by the nobles, Eupatridæ; and when, in 753 B.C. (according to tradition), the term of office was made 10 years, and in 683 B.C. reduced to one, it is clear that the government had become an aristocracy. The name of king was indeed always retained as a title for that one of the archons to whom were intrusted the old priestly functions of royalty. Another archon was called Polemarchus, as the commander in war; while the first, who seems to have been charged with the civil government, was called simply "the archon," and gave his name to the year. See ARCHON.

During this early time the citizens were divided into four tribes, and each tribe into three brotherhoods, though these associations seem to have been older than the tribes. At first only the members of the noble clans belonged to the brotherhoods; but some time in the seventh century B.C. the peasants and craftsmen, who were organized like the nobles, seem to have been admitted, and later enrollment in a brotherhood was required of all legitimate children. The aristocratic government of the three archons and the Council of Elders was forced by the changes common to the Greek world after 700 B.C. to give increasing recognition to wealth apart from birth. The exact course of this revolution cannot be traced, but one step was the institution of the six Thesmothetæ, or junior archons, who took charge of the judicial system. The commercial development of Athens was rapid during this period and led early to the creation of a fleet, though of the details of its organization we are not informed. This prosperity and the introduction of a metallic currency do not seem to have helped the small landowners or the peasants, and, though they loyally supported the government against the conspiracy of Cylon (about 630 B.C.), their condition seems to have grown worse rapidly, perhaps in consequence of a war with Megara. To help them against the oppression under which they suffered, it was decided to form a written code of laws, and about 621 B.C. this work was intrusted to Draco. His labors did not give sufficient relief. The small farmers were driven to borrow money, mortgaging their land, and thus rapidly falling into the power of the rich, while the tenants, who rented land, were often reduced to slavery and even sold out of the country, from inability to pay their debts. A revolution seemed imminent, but was averted by the wise legislation of Solon, in 594–593 or 592–591 B.C. By cancellation of all debts involving the freedom of the debtor, and by freeing all in slavery for debt, he relieved the freeman, while, by the substitution of the Eubœic for the Æginetan standard in coinage, he brought Athens in alliance with Chalcis, and opened the way to the development of the western trade. His great service was the reform of the constitution on a really democratic basis, though outwardly it was still a timocracy. Four classes were now recognized, according to the wealth of the individual citizens, and, though the archonship was open only to the first class, and no offices were granted to those in the fourth, yet as all citizens could vote in the Ecclesia, and sit in the courts, now

established, the election and judgment of the magistrates were in the hands of all and not a privileged few.

The old Council of the Areopagus, composed henceforth of ex-archons, was made the supreme guardian of the laws, and a new senate of 400, chosen equally from the four tribes, was instituted to prepare the business for the Ecclesia. Though the situation was much alleviated by the reforms of Solon, the political parties still continued their struggles. The party of the nobles, living chiefly in the city and the Attic plain, was known as that of the Plain; the moderate party, which was satisfied with the new order, was largely composed of the middle class, and, from the residence of many of them, was called that of the Coast; a third party of a more radical type was that of the Hills, for most of its members seem to have come from the mountain regions. Aided by the Hillmen, Pisistratus made himself tyrant (561 B.C.), and, though twice driven out, finally handed down his power to his sons, who ruled till the murder of Hipparchus (514 B.C.), and expulsion of Hippias (510 B.C). During this time the forms of the constitution had been observed, though all offices had been filled by the friends of the tyrants. The period was one of growth in foreign influence and internal prosperity. The tyrants beautified the city with new temples, introduced a better supply of water, and inaugurated more splendid festivals, thus producing greater contentment with their rule.

After the overthrow of this tyranny by Clisthenes, party strife broke out afresh; but Clisthenes finally succeeded in securing a revision of the constitution which removed entirely the danger of local parties. As a basis for his division of the people, he took the villages or small districts scattered through Attica. These were divided into 30 groups, so arranged that 10 groups were along the coast, 10 in the inland, and 10 about the city. By combining one group from each of these three regions, he formed 10 tribes, which he named after ancient Attic heroes (Erechtheïs, Aigeïs, Pandionis, Leontis, Acamantis, Oineïs, Cecropis, Hippothontis, Aiantis, Antiochis). These tribes were the chief divisions of the people, and from this time the number 10 regularly recurs among the various governing boards of Athens. The old Senate of 400 was replaced by a new one of 500, which became the executive organ of the government, supervising all officials and the finances and even the military management. For convenience in the transaction of routine business the year was divided into 10 periods, and during each period the 50 senators of a tribe, the so-called Prytanes, acted as a standing committee, though the whole body met daily. Along with the new constitution an increase in the citizenship took place, and, though the old property classes and their privileges were undisturbed, the increase of wealth had largely increased the number who could hold office. With Clisthenes the Athenian democracy was fairly established, though other changes in the direction of equalization of privileges, such as the election of archons by lot, the establishment of pay for service in the courts and at the assembly, and a reduction of the power and influence of the Areopagus, were carried out in the course of the fifth and fourth centuries, not always to the advantage of the State. The new government at once proved its value by the rapid advance of Athenian power, which was raised to an undreamed-of height by the repulse of the Persians, and the establishment of the Delian League, which made Athens mistress of the Ægean and its islands. This period (480–430 B.C.), which culminated in the age of Pericles, is the Golden Age of Athenian greatness, and to it belong the greatest triumphs of Athenian genius, the poetry of Æschylus and Sophocles, and the sculpture of Phidias. From this time the history of Athens is merged in the general history of Greece. Though the Peloponnesian War deprived Athens of much of her power, her place as the centre of Hellenic culture remained unshaken, and even when the battle of Chæronea (338 B.C.) deprived her of political position, the philosophic schools and the traditions of the past continued to attract foreigners. The democratic constitution was overthrown by Antipater (322 B.C.), but its forms were afterward restored, and many of the official titles continued to exist long after the incorporation of the city in the Roman Empire.

Under Roman rule Athens prospered, and became the great centre of education for the youth of aristocratic Rome. (See Capes, *University Life in Ancient Athens*, London, 1877.) The Emperor Hadrian, in particular, enlarged the city to the northeast, where a new quarter was named Hadrianapolis in his honor, and built a gymnasium and library. It was about this time that Herodes Atticus erected his Odeum as a memorial of his wife Regilla and repaired the Stadium. The fame of the philosophic schools continued to attract students, though with the spread of Christianity they lost influence and were finally closed by Justinian in 529 A.D. During the following centuries many of the temples were converted into churches; but from the sixth to the eleventh century Athens almost disappears from history. Basil II visited it in 1018 to celebrate a victory over the Bulgarians, and in 1175 Michael Acominatos became Metropolitan of Athens. His letters and orations give a valuable picture of the wretchedness and desolation into which the city had fallen. In 1204 the capture of Constantinople by the Crusaders enabled Boniface of Montferrat to establish himself as King at Thessalonica, while Athens and Thebes fell to his feudal vassal, Otho de la Roche, and in 1260 the Frankish rulers assumed the title of Dukes of Athens, their dominion also including Thebes, Megara, and Argos. A succession of Frankish dukes ruled until the disastrous battle of Lake Copaïs threw the real power into the hands of the great Catalan company of mercenaries, and they seem to have held the real control, though recognizing the suzerainty of non-resident dukes, until 1387, when Nerio Acciajuoli, a Florentine who at the time ruled Corinth, made himself master of the city, and he and his successors maintained control over it until 1458, though after 1392 they were tributary to the Sultan, who was the real ruler of Athens.

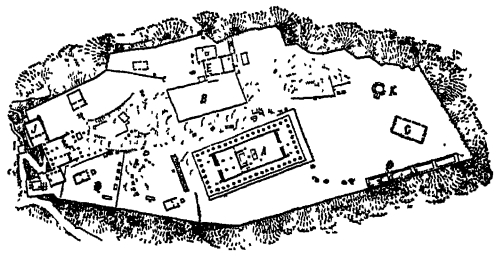
For a long while after its capture by the Turks Athens almost disappeared from the view of the Western world, but a letter written in 1578 gives the population at the time as 12,000. The Venetians captured the city in 1687, and during the siege a bomb partially destroyed the Parthenon, which had been used as a powder magazine by the Turks. In 1690 the Turkish rule was reëstablished, and continued until the achievement of Greek independence, though it was not till 1833 that the Turkish garrison was

withdrawn. In 1835 the capital of the new kingdom was established at Athens, and with this period begins the history of the modern city.

**Archæology.** The central point of the ancient city was the Acropolis, but the modern city lies almost entirely to the north and east between the Acropolis and Mount Lycabettus, and along the west slope of the latter, though a modern quarter is growing up on the banks of the Ilissus. On the east and south of the city flows the Ilissus, and on the west the Cephissus, whose scanty supply of water is now largely diverted for the irrigation of the extensive olive groves in that quarter. Though the city itself is some distance from the sea, it is well supplied with harbors. The first harbor was the open bay of Phalerum, with its sloping sandy beach, well suited for the light boats of the early time, but not easy of defense. Somewhat farther from the city is the rocky peninsula of the Piræus, with two small harbors, Munichia and Zea, on the east; and on the west a much larger basin, all nearly landlocked, and easily defended from the rugged hill of Munichia. The advantages of Piræus were first seen by Themistocles; and the fortification of the peninsula was completed soon after the Persian wars. The harbors were connected with the city by the "long walls," at first so built as to include Phalerum, though later the southern wall was abandoned and a new one built close to the northern, furnishing connection with Piræus alone, which had become the only important harbor.

The earliest city was undoubtedly on the Acropolis, where excavations have shown a "cyclopean" wall like those of Tiryns and Mycenæ, and remains of a palace and dwellings of the Mycenæan Period. The town seems also to have extended down the west slope into the valley at the foot of the Pnyx and probably along the south side for some distance; and this lower city was also inclosed by a strong wall in whose circuit there were nine gates. The most remarkable of these gates was the Dipylon, so called, within and without which was located the famous Ceramicus, or Potters' quarter. This gate, the principal one of Ancient Athens, consisted of inner and outer double gates separated by a rectangular court. The structure was flanked by towers. It is outside this gate that the great cemetery of Athens was discovered. A part of the ancient settlement embraced within this wall, including various sanctuaries, was regarded in later times as sacred ground, the so-called Pelargicon. There were also ancient settlements along the Ilissus, where later were some of the most revered sanctuaries, and apparently also on the hills to the west of the Acropolis, where there are many foundations for small houses, cisterns, and steps cut in the rock. These dwellings were outside the later walls and were abandoned before the fourth century B.C., as graves of that period have been found inside the earlier houses. Close to the Acropolis on the northwest is the bare rock of the Areopagus, and, farther to the west and southwest, across a valley runs a long ridge, crowned at the south by the Hill of the Muses, with the monument of Philipappus, erected at the beginning of the second century A.D., and at the north by the Hill of the Nymphs, the site of the modern astronomical observatory. Between the two is the Pnyx Hill, where was the ancient place of assembly. In the earliest times the Acropolis and its neighboring walls formed the only fortification, and it is still a disputed point whether there were any other defenses at the time of the Persian wars. The evidence renders it not improbable that there was an outer wall at that time, but the extent inclosed by it cannot be determined. We only know that it was much less than the space inclosed by the wall of Themistocles, built in great haste immediately after the Persian wars (479 B.C.). The course of this wall seems to have been preserved in later times and can be traced in places by remains of the foundations, by the nature of the ground, and by the presence of graves, which in later times were always outside the walls. Its exact line, however, cannot be determined. Under the Emperor Hadrian the limits of the city seem to have been extended on the east so as to include the Olympieum (see below), and that portion of the city now occupied by the palace and its gardens. The line of the ancient wall in this region is probably marked by the Gate of Hadrian.

The Acropolis was the religious centre of the city, and before the time of Pericles was given up to temples and shrines. The site of the old royal palace seems early to have been marked by a temple of Athena, the patron goddess of the city, which was adorned by the Pisistratidæ with a colonnade, the gables of which were filled with sculptures representing the battle of the gods and giants. A part of these sculptures, valuable as illustrating the art of the close of the sixth century B.C., have been pieced together from fragments discovered during the excavations. Probably to the same time as this temple belong the foundations of an ancient gateway, set at an angle to the present line of ascent. The temple and all the other buildings on the Acropolis were destroyed by the Persians (480–479 B.C.) and were certainly never entirely rebuilt, though it is believed by some that the cella (q.v.) of the old temple was reërected and remained standing even into Roman times. Under Themistocles, Cimon, and Pericles the work

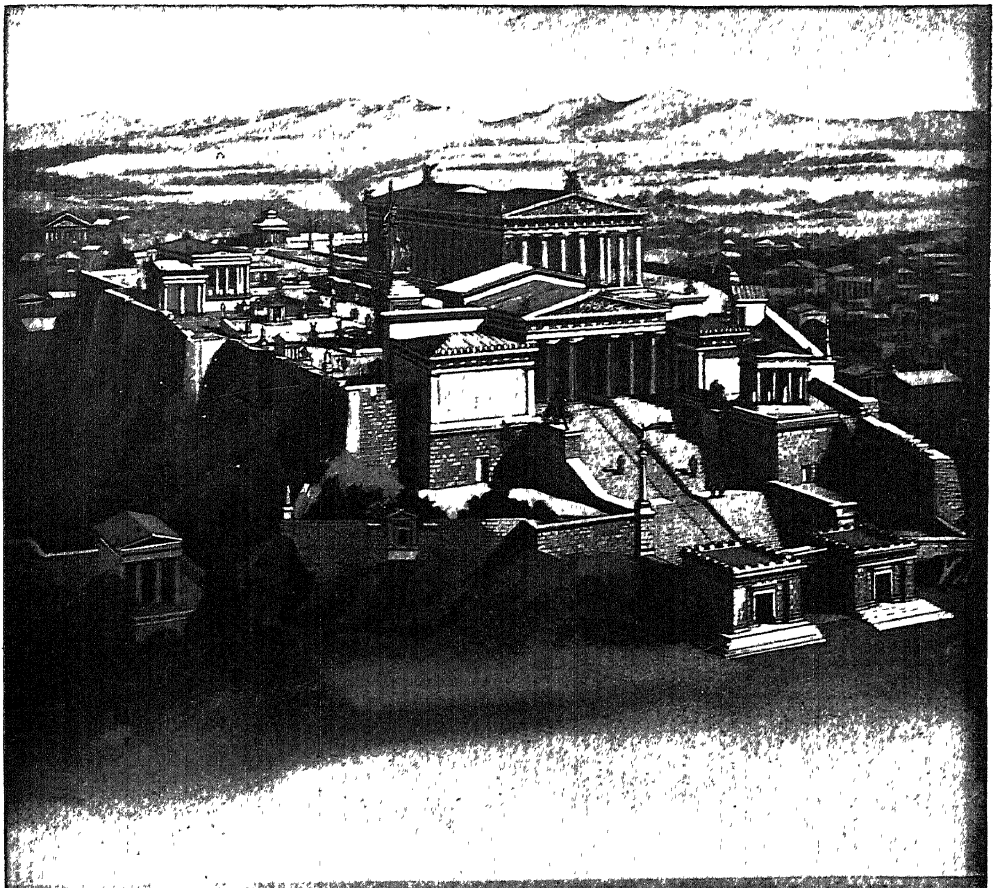


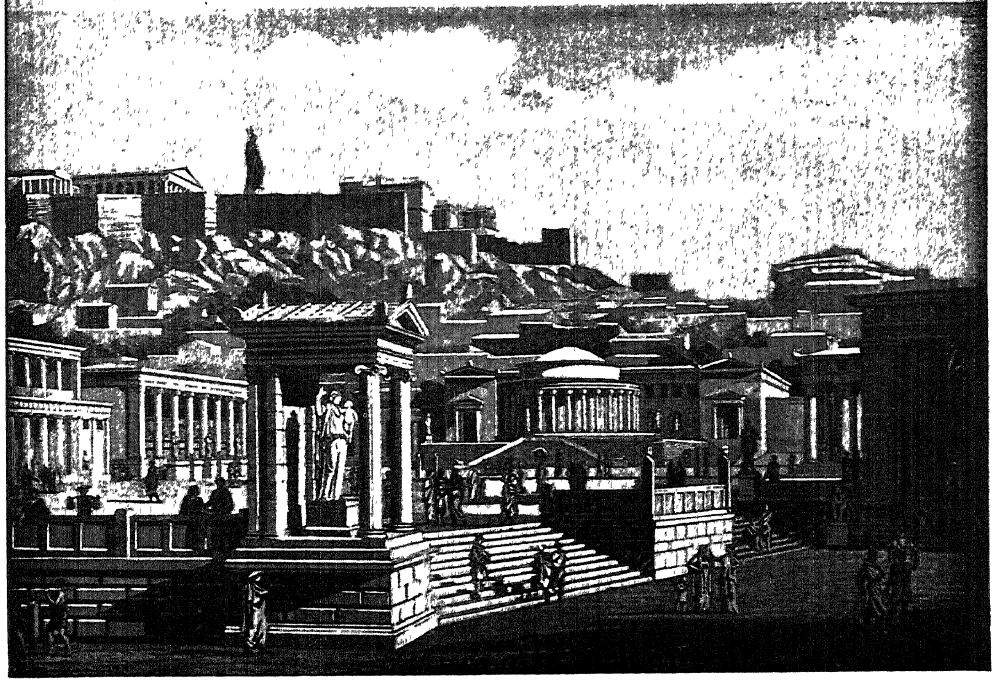
ACROPOLIS OF ATHENS.

*A*—Parthenon.
*B*—Foundation of Early Temple.
*C*—Museum.
*D*—Terrace.
*E*—Erechtheum.
*F*—Propylæa.
*G*—Precinct of Artemis Brauronia.
*H*—Temple of Victory.
*J*—Agrippa Pedestal.
*J*—Ainacotheca.
*K*—Altar to Rome and Augustus Cæsar.

of reconstructing the Acropolis was carried forward. On the south side a lofty retaining wall was built, and the ground filled in so as to form a terrace at the level of the old summit, and on this terrace was erected the Parthenon (q.v.), the chief glory of Athens and even in its ruins the most perfect specimen of Greek architectural genius. The present building was erected on the site of a temple begun by Themistocles or Cimon, and seems to have been completed about 437 B.C. North of the Parthenon, close to the

# ATHENS—RESTORATIONS





1. THE ACROPOLIS.

2. THE AGORA.

site of the old temple was built the Erechtheum, containing probably the ancient statue of Athena Polias, said to have fallen from heaven, the sacred olive of Athena, and the salt spring where Poseidon smote the rock with his trident. The building is now partially restored. (Consult B. H. Hill, "Structural Notes on the Erechtheum," *American Journal of Archæology*, pp. 291–297 (1910): G. P. Stevens, "The East Wall of the Erechtheum," op. cit.; and G. W. Elderkin, *Problems in Periclean Buildings* (Princeton, 1912).) Near the west end stood the colossal bronze statue of Athena Promachos, erected by the Athenians as a memorial of the victories over Persia.

Northeast of the Parthenon was the great altar of Athena, and near by was erected later a temple of Augustus and Rome. On the south side of the Acropolis, west of the Parthenon, were sacred precincts, dedicated to Athena Ergane (the worker) and Artemis Brauronia. At the west end of the Acropolis, where alone the rock permits an easy ascent, stood the great gateway, the Propylæa, begun in 437 B.C. and never completed according to the original plan. (See W. B. Dinsmoor, "The Gables of the Propylæa," *American Journal of Archæology*, 1910, pp. 143–184). Just outside the Propylæa, on a high platform, reached now from the upper part of the Acropolis, but in ancient times also accessible by a staircase outside the gate, stood the little Ionic temple of Athena Nike, less correctly called that of "Wingless Victory." All these buildings were of white Pentelic marble and richly decorated with gilding and color. At the foot of the steep precipice on the northeast side of the Areopagus is a cave with a pool of dark water, which is believed to have been the site of the shrine of the Eumenides, and the region west of the Acropolis and south of the Areopagus probably contained other temples, of which all traces have disappeared. Farther down the slope toward the west, in the valley between the Pnyx and the Areopagus, has been discovered an ancient street, which evidently led from the market place to the Acropolis. It was lined with private houses and shrines. On the slope of the Areopagus was a large sacred inclosure, containing wine vats, and apparently dedicated to Dionysus, as it contained a long inscription with various regulations of the Iobacchæ, a society of worshipers of that god. At the foot of the Pnyx were many wells and chambers for collecting water, and there are traces of a large fountain, to which water was brought by an underground channel from the upper Ilissus along the south side of the Acropolis. This is held by many archæologists to be the work of Pisistratus and to mark the site of the Enneacrunos, or fountain with nine streams, erected by him over an open spring, Callirrhoë. Others, however, maintain that the evidence favors placing Callirrhoë and the Enneacrunos at a point in the bed of the Ilissus, where abundant springs are still found.

Passing from the gate down to the south side of the Acropolis, we find at the west end the Odeum of Herodes Atticus (see ATTICUS HERODES), which is still well preserved. Adjoining this was the long stoa, or portico built for the Athenians by Eumenes II, King of Pergamum (197–159 B.C.). Back of the stoa on a terrace at the foot of the steep cliff of the Acropolis lay the sanctuary of Asclepius, containing his temple and altar, and colonnades and other buildings for the sick, who came thither for healing. In a cave inside the sacred ground was a spring, still supposed to possess curative powers and dedicated to the Virgin. East of the Asclepieum and the Stoa of Eumenes was the great theatre of Dionysus, with its seats partly cut in the solid rock, and back of its stage buildings the temple and precinct of the god in whose honor the plays were performed. This theatre was erected on the site of an older building in the last half of the fourth century during the administration of the orator Lycurgus. On the north side of the Acropolis lay many public buildings, but this region is still thickly populated, and only the caves of Pan and Apollo high in the northwest corner of the Acropolis have been thoroughly excavated. North of the Areopagus lay the great market place, surrounded with colonnades and public buildings, and near by Hadrian built a large gymnasium and baths, considerable remains of which can still be traced.

The most notable building of ancient times in this portion of the city is the so-called Theseum, perhaps better designated as the Hephæsteum, a hexastyle peripteral temple in the Doric style (104 feet by 45½ feet), situated on a slight eminence north of the Areopagus and west of the market place. This is the best-preserved Greek temple left to us. The name Theseum is certainly wrong, as the sanctuary of Theseus was in another part of Athens and was a large inclosure; but the true name of the building is still uncertain, though modern archæological opinion tends in favor of the temple of Hephæstus, which must have stood in this quarter of the city. The temple was built about the same time as the Parthenon, or, more probably, somewhat earlier, though on this point authority is divided. Of the pediment sculptures no trace remains, but at the east end of the portico are sculptured metopes, and across each end of the cella is a frieze in relief. The metopes represent the labors of Heracles and Theseus; the subject of the west frieze is the battle between the Centaurs and Lapithæ, and that of the east a battle in the presence of six seated gods. During the Middle Ages the building was changed into a church, but with little change of the exterior. Outside the Themistoclean Wall to the southeast of the Acropolis was the great temple of Olympian Zeus, begun by Pisistratus, but long left unfinished. About 174 B.C. Antiochus Epiphanes of Syria completed, or rather rebuilt, the temple, on a scale of magnificence which led Livy to say that, though unfinished, it was the only one on earth corresponding to the greatness of the god. The great platform measures 676 feet by 426 feet, and on this the architect Cossutius erected a temple 354 feet by 135 feet, measured on the upper step of the stylobate. It had three rows of eight Corinthian columns at each end, and two rows of 20 columns each at the sides, counting the corner columns twice. The magnificent scale of the work again delayed its completion, and it was not till the second visit of the Emperor Hadrian (129 A.D.) that it was finally dedicated. At present only 16 columns remain, one of which lies where it was prostrated by an earthquake. These columns are 56 feet 7 inches high and 5 feet 7 inches in diameter at the base, with 24 flutings. Excavations have brought to light the foundations of the earlier temple of Pisistratus.

Not far from the Olympieum, across the Ilis-

sus, was the Stadium, laid out in a hollow between low parallel hills. The ground inclosed by the seats is 670 feet long by 109 feet wide. The Stadium seems to have been constructed by the orator Lycurgus, about 330 B.C., was rebuilt in white marble by Herodes Atticus, about 140 A.D., and largely burned for lime during the Middle Ages; its restoration in marble (completed in 1902) was made possible by the liberality of a wealthy Greek of Alexandria, to whose initiative the establishment of the new Olympic games in 1896 was due. See ATHLETICS.

For the topography and monuments of ancient Athens, consult: Stuart and Revett, *Antiquities of Athens* (London, 1762–1816); Leake, *Topography of Athens* (London, 1841); Wachsmuth, *Die Stadt Athen im Alterthum* (Leipzig, 1874–90); Harrison and Verrall, *Mythology and Monuments of Ancient Athens* (London, 1890); Curtius, *Stadtgeschichte von Athen* (Berlin, 1891), which contains a very valuable classified collection of ancient passages relating to this subject, by Milchhöfer; Frazer, *Pausanias*, vols. i, ii (London, 1898). Pausanias (q.v.) gives an account of the monuments of Athens in his day, and the works of Frazer and Miss Harrison include a translation of his text and full commentary. Valuable also is the work of Lolling in Müller's *Handbuch der klassischen Altertumswissenschaft*, vol. iii (Nördlingen, 1889); and Milchhöfer in Baumeister's *Denkmäler des klassischen Altertums*, vol. i (Munich, 1885). For the Acropolis, consult: Bötticher, *Die Akropolis von Athen* (Berlin, 1888), and Miller, in *American Journal of Archæology*, vol. viii (Baltimore, 1893); also, Curtius and Kiepert, *Atlas von Athen* (Berlin, 1878). Athenian history is treated in the general histories of Greece. Aristotle wrote on the Constitution of Athens, and his work, first published in 1891, has been translated by Kenyon (London, 1891). Other important works are: Botsford, *Development of the Athenian Constitution* (Boston, 1893); and Wilamowitz-Möllendorf, *Aristoteles und Athen* (Berlin, 1893). For Athens during the Roman period and later, consult: Finlay, *History of Greece* (Oxford, 1877); Hertzberg, *Athen* (Halle, 1885). Other works of special value are: Laborde, *Athènes aux XVème, XVIème, et XVIIème siècles* (Paris, 1855) for its collection of documents; Gregorovius, *Geschichte der Stadt Athen im Mittelalter* (Stuttgart, 1889). Consult also: Dyer, *Ancient Athens* (London, 1873); C. Wordsworth, *Athens and Attica* (London, 1869); Symonds, *Sketches in Italy and Greece* (London, 1882); Freeman, *Historical Essays*, series iii (London, 1892); Horton, *Modern Athens* (New York, 1901); Bikelas, "L'Athènes d'aujourd'hui," in *Revue d'études grecques*, no. xi (Paris, 1898); Ferguson "Bibliography of Works Referring to Athens," in *The Athenian Secretaries* (New York, 1898); F. C. Penrose, *Principles of Athenian Architecture* (London, 1888); J. H. Middleton and E. A. Gardner, *Plans and Drawings of Athenian Buildings* (London, 1900); W. Judeich, *Topographie Von Athen* (Munich, 1905: is second half of part ii, vol. iii of 3d ed. of Von Müller's *Handbuch der klassichen Alterthumswissenschaft*); M. L. D'Ooge, *Acropolis of Athens* (1909); Michaelis, *Der Parthenon* (Leipzig, 1871); W. Miller, *Latins in the Levant* (London, 1908); C. H. Weller, *Athens and its Monuments* (New York, 1913).

**ATHENS.** A town and the county-seat of Limestone Co., Ala., 100 miles north of Birmingham, on the Louisville and Nashville Railroad (Map: Alabama, C 1). It is the seat of Athens Female College (Methodist Episcopal South), opened in 1843, Greens University, the (colored) Trinity College, and of a State Agricultural School. The town has a cotton mill, a planing mill, and an ice plant, and owns its water works and electric light plant. Pop., 1900, 1010; 1910, 1715. On Sept. 23, 1864, Colonel Campbell, with 600 Federal troops, surrendered here to General Forrest, at the head of a large force of Confederate cavalry, who soon evacuated.

**ATHENS.** A city and the county-seat of Clarke Co., Ga., on the Oconee River, 69 miles by rail east by north of Atlanta, and on the Southern, the Central of Georgia, the Georgia, the Seaboard Air Line, and the Gainesville Midland railroads (Map: Georgia, C 2). The city is an important cotton market, and contains several cotton mills, fertilizer factories, etc. It is the seat of the University of Georgia (q.v.), opened in 1801, the Georgia State College of Agriculture, organized in 1872, the Lucy Cobb Institute for Girls, and a State normal school and has a public library and the celebrated "tree that owns itself," a tree protected by a deed to it of 16 feet of land made by Col. William H. Jackson. The city owns and operates its water works. The government is vested in a mayor, elected biennially, and a council. Athens was founded, as the seat of the State University, in 1801. Pop., 1900, 10,245; 1910, 14,913; 1920, 16,748.

**ATHENS.** A city and the county-seat of Athens Co., Ohio, 75 miles southwest of Columbus, on the Hocking River, and on the Baltimore and Ohio Southwestern, the Toledo and Ohio Central, and the Hocking Valley railroads (Map: Ohio, F 7). Athens has manufactures of lumber and brick and is the centre of an extensive coal-mining region. It is the seat of the Ohio University (State) (q.v.), opened in 1804, and of a State hospital for the insane, and has a Carnegie library. Settled in 1797, and incorporated in 1811, Athens is governed by a mayor, elected biennially, and a city council. The water works and electric light plant are owned and operated by the municipality. Pop., 1900, 3066; 1910, 5463. Consult Walker, *History of Athens County* (Cincinnati, 1869).

**ATHENS.** A borough in Bradford Co., Pa., 2 miles south of N. Y. State Line, on the Lehigh Valley Railroad, and on the Susquehanna and Chemung rivers (Map: Pennsylvania, H 2). The principal industries include cigar, overall, tool, and furniture factories, foundries, silk and planing mills, boat, milling and produce companies. Pop., 1900, 3749; 1910, 3796.

**ATHENS.** A town and the county-seat of McMinn Co., Tenn., 56 miles northeast of Chattanooga, on the Southern Railway (Map: Tennessee, F 3). It is the seat of the U. S. Grant University (Methodist Episcopal), opened in 1867. The town has planing, cotton, knitting and woolen mills. Athens was laid out in 1823 and was incorporated in 1868. Pop., 1890, 2224; 1900, 1849; 1910, 2264.

**ATHENS.** A city and the county-seat of Henderson Co., Tex., 75 miles southeast of Dallas, on the St. Louis Southwestern and Texas and New Orleans railroads (Map: Texas, E 3). The region is adapted to cotton, fruit, and vegetable growing, has an abundance of hard and soft timber, and contains deposits of coal. The principal industries include the manufacture of

pottery, fire brick, and tile. The city has a fine courthouse, good schools, and owns its water works. Pop., 1910, 2261.

**ATHENS OF AMERICA,** The, or The Modern Athens. A name given to Boston, Mass., in the day of her literary preëminence, and still hers by reason of her spirit of culture.

**ATHENS OF THE NORTH,** The. A title sometimes applied to Edinburgh. Copenhagen is another European city so styled.

**ATHENS OF THE WEST,** The. Cordova (q.v.).

**ATH'ERO'MA** (Gk. *ἀθήρωμα, athērōma,* a tumor full of gruel-like matter, from *ἀθήρη, athērē,* groats, meal). A yellow, cheesy material, composed of fat, cholesterin, sebaceous matter, albumen, chalk, and detritus of epithelium, found in cysts (as of the scalp). The term is now more commonly applied to the fatty degeneration of the arterial walls. See Arteriosclerosis; Artery.

**ATH'ERTON.** A manufacturing and mining town in Lancashire, England, 4½ miles southwest of Bolton. The civic spirit is exemplified by the municipalization of water, gas, and electric lighting and traffic plants, and the erection of a dust destructor and public offices. There are numerous collieries, and cotton and iron goods are the leading manufactures. Pop., 1891, 13,700; 1901, 16,200; 1911, 18,982.

**ATHERTON,** Charles Gordon (1804–53). An American politician, born in Amherst, N. H. He graduated at Harvard in 1822 and was a member of the State Legislature for five years and Speaker of the Lower House for three. In 1837 he was elected to Congress and served in the House in 1837–43, and in the Senate in 1843–49 and in 1852–53. In December, 1838, he introduced the notorious "Atherton-gag" resolution, prescribing that "all petitions relating to slavery, or to its abolition, be laid on the table without debate." The measure was stubbornly fought by John Quincy Adams, who insisted on the "right of petition"; but it was passed by a vote of 120 to 78 and remained in effect until 1844. See Gag Rules.

**ATHERTON,** Gertrude Franklin (Horn) (1857–). An American novelist, the grandniece of Benjamin Franklin, born at San Francisco, Cal., educated in California and in Lexington, Ky. She became the wife of G. H. B. Atherton, now deceased. The background to a series of her novels (see below) is California, and of the life of her State to-day she has given memorable studies. In the East she is almost equally at home: witness *Patience Sparhawk* (1897), with its satirical study of life in New York and Westchester County; *Aristocrats* (1901), which has the Adirondacks for its setting; or *Senator North* (1900), with its intimate pictures of social and political life in Washington. Frequently she attempts subjects of an epic breadth, as in *The Conqueror* (1902), where the personal story of Alexander Hamilton stands out in relief against the national life of his time. The following list includes the more important of her books: The California series—*The Splendid Idle Forties,* a revised and enlarged edition of *Before the Gringo Came* (1892); *The Doomswoman* (1892); *A Whirl Asunder* (1895); *The Californians* (1898); *American Wives and English Husbands* (1898); *A Daughter of the Vine* (1899); *Rezanov* (1906); *Ancestors* (1907). Other novels: *Patience Sparhawk* (1897); *Senator North* (1900); *Aristocrats* (1901); *The Conqueror* (1902); *Tower of Ivory* (1910); *Julia France and Her Times* (1912).

**ATHERTON RES'OLU'TIONS.** See Gag Rules.

**ATH'LETE,** The. A statue representing the typical proportions of the Greek athlete, a copy of the Doryphorus (spear-bearer) of Polycletus. It was found in the so-called Curia Isiaca at Pompeii and is now at Naples in the Museo Nazionale.

**ATHLET'ICS** (from Gk. *ἀθλητής, athlētēs,* contestant). The term has of late been definitely applied to recognized contests of physical skill and endurance for pastime and for the development of bodily strength. These are commonly divided into two classes—track and field games and gymnastic performances. The former include the running or walking of various distances, hurdling, high and broad jumping, pole-vaulting, throwing the hammer and weight, and putting the shot. The latter comprise the use of Indian clubs, dumbbells, parallel and horizontal bars, weight-lifting, rope-climbing, tug of war, and various exercises in vaulting over fixed objects.

Athletic games were brought to a high development among the Greeks, and a class of professional athletes grew up, who began their training when scarcely out of boyhood. They were obliged to submit to a rigorous discipline, including careful avoidance of excesses, a special diet, regular exercise, and the cultivation of courage, self-control, and resourcefulness. There were at all times among the Greeks those who practiced athletic exercises from pure love of sport; but when these ancient amateurs competed in the games, they preferred running, jumping, and javelin-throwing, where natural vigor might take the place of long exercise. In later times the athlete was a huge mass of flesh and muscle, as may be seen in the mosaic from the Baths of Caracalla, or even in the fine realistic bronze statue of a pugilist in Rome, or the brutal head of a boxer from Olympia. Under the Roman Empire we find the professional athletes organized into corporations. See Games, Ancient.

Of the Britons before the Roman conquest we know that they were bold, active, and capable of bearing great fatigue. The Romans drafted the strongest of them into military service, and by the introduction of luxurious habits debilitated the weaker ones who were left at home. The later infusion of the new blood of the Teutonic tribes corrected this tendency and brought with it a new love of athletic contests. Wherever a Scandinavian leader has left a tradition at all, it is one relating to his feats of strength and agility. Thus Olaf Tryggeson, an early King of Norway, boasted that he could walk round the outside of his boat upon the oars as the men were rowing; that he could hurl two spears at once, one from either hand, and that he excelled all men in archery and swimming. In the later Saxon period such exercises as inured the body to hardship and fatigue constituted the chief part of the education of youth. With the introduction of the Norman influence and the tendencies of the age of chivalry, tournaments, jousts, and other contests of personal skill and prowess were the principal diversion of the upper classes. The sons of citizens and yeomen had their sports as well; they fought with clubs and bucklers and ran at the quintain on every village green, and contended with poles

on the ice in winter, "not always without hurt," as Fitzstephen says, "for some break their arms and some their legs, but youth, emulous of glory, seek these exercises." With the decay of chivalry a great change took place toward the end of the fifteenth century, and exercises requiring the exertion of muscular strength went out of fashion to such an extent that the government thought it necessary to interfere. A proclamation of Henry VII, after reciting that "it ever hath bene of old antiquitie used in this realme for all lustye gentlemen to pass the delectable season of summer after divers manner and sundry fashions of disport," establishes a series of exercises with prizes to be contested for in open competition. His successor, Henry VIII, added example to precept in his younger days, and daily amused himself in casting the bar, wrestling, fencing with sword or battle-axe, throwing the hammer, and similar recreations, in which few could excel him. Such pastimes, with broad jumping and running, were, according to the authority of Thomas Wilson in *The Arte of Rhetorique* (1551), "the necessary accomplishment of a man of fashion." James I formulated a set of rules for his son, with the very modern conclusion that "bodily exercises are very commendable, as well for the banishing of idleness as for the making the body able and durable"; adding in a passage of the true spirit, "the exercises I would have you to use, although but moderately, *not making a craft of them*, are running, leaping, wrestling, fencing, playing at the caitch or tennise, archerie, palle-malle, and such like other fair and pleasant field games." The troublous times of the Rebellion, with the prejudice of the Puritans against all that had gone to make appropriate the title of "Merry England," and the dissoluteness of the court of Charles II, tended to destroy the athletic spirit, except in the country villages, where the old games lingered. Otherwise during the eighteenth century and the early part of the nineteenth athletics dwindled well-nigh to extinction, and the moral and physical condition of the youth of England suffered to a proportionate extent.

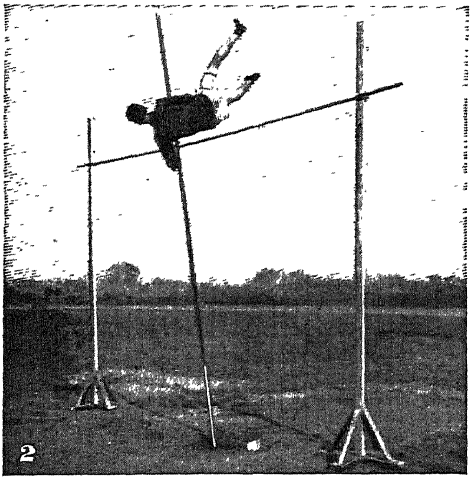
Fortunately, about the year 1850, an athletic revival occurred in England affecting all branches of sport, furthered not a little by the energetic deliverances of Charles Kingsley and his school in favor of "muscular Christianity." Athletic games of a sort had been established about the year 1812 at the Royal Military College, Sandhurst. In 1837 the Rugby Crick run began, and soon afterward regular games were held also at the Woolwich Military Academy and a number of the great public schools. Probably the first athletic sports held in modern fashion occurred at Exeter College, Oxford, in 1850; they included sprints and long-distance running, followed later by jumping, hurdling, and weight events. The movement rapidly spread, and athletic clubs began to be formed. The Cambridge University games were established in 1857, and the Oxford games three years later. The inter-university boat race dates from 1856 as an annual event; there had been a university boat club at Oxford since 1839. In 1864 the Oxford and Cambridge track and field games were established. The events of the first meeting were 100 yards, 440 yards, and one-mile runs; high and broad jumps; 120 yards and 200 yards hurdle races; and a steeplechase. Within the decade 1850–60 athletic meetings became a regular feature of school and college life, and through their influence amateur athletic sport became general throughout the kingdom. The London Athletic Club dates from 1866 (though it really grew out of a smaller organization of three years earlier), and the national amateur championships were established in the same year. The latter were for some years managed by the Amateur Athletic Club, whose attempt to become the regulating amateur organization subsequently failed. In 1880 the Amateur Athletic Association was founded as the national governing body for England. It is allied with the Scottish and Irish Amateur Associations and with the British swimming and cycling associations. The national championships now consist of 100 yards; 440 yards, half-mile, mile, and four-mile and ten-mile runs; 120-yard hurdles; high and broad jumps; hammer-throwing and weight-putting; pole-vaulting; two-mile and seven-mile walks; and two-mile steeplechase. A 10-mile championship run is also held in the spring. The Oxford and Cambridge sports include the first 11 of the above events, substituting a three-mile for the two distance runs. Other important English events are the London Athletic Club and Putney Athletic Club games, the Civil Service, the United Hospitals, and the Railway Clearing-house sports. Cross-country running has made Englishmen the best of long-distance runners.

**American and International Athletics.** Athletics became popular in the United States in the early seventies. A movement soon arose to bring them under definite organization, and in 1879 the National Association of Amateur Athletes of America was formed, out of which grew the Amateur Athletic Union, which held its first annual meeting at Detroit, Mich., in 1888, and was reorganized in 1891. It controls all matters concerning amateur athletics and recognizes the following sports: basket ball, billiards, boxing, fencing, gymnastics, hand-ball, running, jumping, walking, weight-putting, hurdle-racing, lacrosse, pole-vaulting, swimming, tugs-of-war, and wrestling. Its authority is universally recognized.

In America, as in England, the colleges exert an important influence on amateur athletics. College training methods are, on the whole, more scientific than those of the majority of athletic clubs, and most of the leading athletes come from the colleges. Their governing bodies are the Intercollegiate Association of Amateur Athletes of America and the Western Intercollegiate Association. Allied with them is the national body, the Amateur Athletic Union, with its eight sectional groups. The first intercollegiate athletic meeting was held at Saratoga in 1873. Contests have been held between representative American and English athletes on both sides of the Atlantic for over half a century.

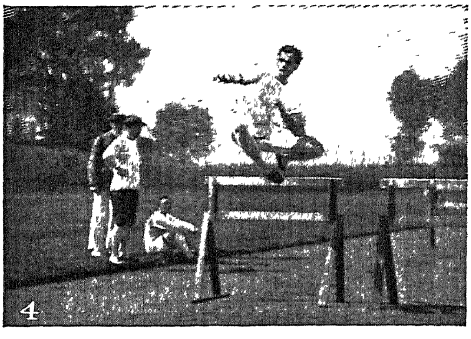
Consult: Anderson, *The Making of a Perfect Man* (New York, 1901); James, *Practical Training* (New York, 1897); Dowdwig, *Games in Preparatory Schools* (London, 1900); Crowther and Ruhl, *Rowing and Track Athletics* (New York, 1905); Sargent, *Athletic Sports* (New York, 1897); Barbour and others, *Book of School and College Sports* (New York, 1904); Dudley and Kellor, *Athletic Games in the Education of Women* (New York, 1909); Graham and Clark, *Practical Track and Field Athletics* (New York, 1910); *Outdoor Sports* (New York, 1912). Consult also the books in the Badminton Library



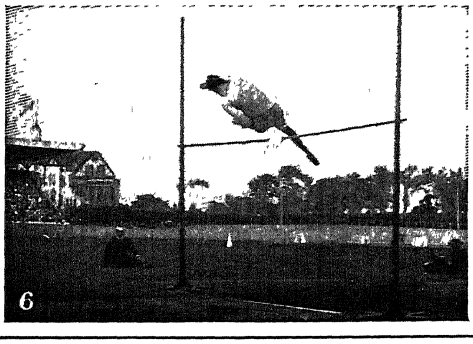
















1. SPRINTERS, showing different styles of starting.
2. POLE VAULTING.
3. BROAD JUMP.
4. HURDLING.
5. PUTTING THE SHOT.
6. HIGH JUMP.
7. THROWING THE HAMMER.

on Athletics. See articles on BASEBALL; FIELD SPORTS; OLYMPIC GAMES; FOOTBALL; ROWING; BASKET BALL; AMATEUR.

**ATHLONE**, ăth-lōn'. A town of Ireland, on both sides of the Shannon, 75 miles west of Dublin, in the counties of Westmeath and Roscommon (Map: Ireland, D 3). It is an agricultural centre, and has manufactures of felt hats, friezes, linens, and corsets. Improved transportation facilities by means of locks and canals enable large river steamers to navigate the Shannon for 116 miles from Killaloe to Carrick-on-Shannon, thus circumnavigating the river rapids. The Shannon is here crossed by a fine iron railroad bridge. Athlone is one of the chief military positions in Ireland. The fortifications once covered 15 acres and contained barracks for 1500 men, but are now dismantled. Pop., 1901, 10,701; 1911, 9,631. During the last attempt of James II to recover his throne in 1690 Athlone suffered two sieges and was finally taken by assault.

**ATHOL**, ăth'ŏl. A town in Worcester Co., Mass., 82 miles west by north of Boston, on the Fitchburg Division of the Boston and Maine and a branch of the Boston and Albany railroads (Map: Massachusetts, C 2). It has a public library and manufactories of shoes, mechanical tools and machinery, silk, furniture, lumber products, toys, woolen goods, etc. The government is administered by town meetings. Athol was first settled in 1735 and was called Pequoig until 1762, when it was incorporated as a town under its present name. It owns its water works. Pop., 1890, 6319; 1900, 7061; 1910, 8536. Consult *History of Worcester County* (2 vols., Boston, 1879).

**ATHOR**, ä'thōr, **ATHYR**, ä'thĭr, or **HATHOR**, hä'thōr (Egyptian *Hat-hor*). An Egyptian goddess. The original seat of her cult seems to have been Denderah in upper Egypt, where the ruins of her famous temple are still to be seen, but at a very early period her worship spread over the whole of Egypt. Her primitive fetish was, apparently, a buffalo's skull raised on a pole, and from this was developed the sacred Athor column, which plays an important part in Egyptian architecture, bearing, as capital, a female head with the ears of a cow. The same head forms the central ornament of the *sistrum*, or rattle for temple music, which appears among the insignia of this goddess. In later times Athor was regarded as the goddess of music and the dance, of joy and love. By the Greeks she was identified with Aphrodite (Venus). Earlier, however, she was conceived as a cosmical divinity, typifying the sky, and the traditional explanation of her name as meaning "the house of horns" (i.e., of the sun) is a result of this conception. The world is frequently represented in the form of her sacred animal, the cow, bearing between her horns the sun-god or his disk. In Egyptian mythological texts Athor is sometimes called the mother of the sun, which is daily born from the sky. As the nocturnal sky, she became the goddess of the dead, and, under the latest dynasties, deceased women were supposed to become Athor, just as deceased men became Osiris. The representations of Athor vary greatly. Usually she is depicted in the form of a woman with a cow's head. The third month of the Egyptian year (Athor) was named for this goddess. For illustration, see EGYPT.

**ATH'OS** (Gk. *Ἄθως*, called in modern times *Ἅγιον Ὄρος, Hagion Oros*, by the Greeks, and Monte Santo by the Italians, both names signifying Holy Mount) (Map: Balkan States, E 4). Properly the highest elevation on the easternmost of the three Chalcidian peninsulas. In a broader sense of the word the whole peninsula was called Athos. The peninsula is about 40 miles long and is connected with the mainland by an isthmus hardly a mile and a half broad. It contained in ancient times several towns. The mountain Athos (6349 feet), called in ancient times Acte, is at its southern extremity. The point was a perilous one for sailors, and Xerxes, when planning the invasion of Greece, ran a canal through the isthmus, traces of which are still to be seen. Mount Athos has been since the Middle Ages the seat of a monastic republic, which, at the present time, consists of 20 monasteries, about 3000 monks, and 3000 lay brethren. The origin of some of these religious houses is dated by legend as far back as the time of Constantine. In the thirteenth century they were pillaged by the Latin conquerors of Constantinople, but recovered under the succeeding emperors. In recent times they have through three centuries of Moslem rule preserved their independence and former privileges. In the Middle Ages they were the centre of Greek learning and they have furnished to scholars many valuable Greek manuscripts, but at the present day there is a universal lack of learning among the monks of these establishments. Consult: Curzon, *Visits to Monasteries in the Levant* (London, 1881); A. Neyrat, *L'Athos* (Paris, 1880); Athelstan Riley, *Athos* (London, 1887); Brockhaus, *Die Kunst in den Athosklostern* (Leipzig, 1891); Gelzer, *Vom Heiligen Berge und aus Makedonien* (Leipzig, 1904); S. Lambros, *Catalogue of the Greek Manuscripts on Mount Athos* (1895, 1900). See BALKAN WAR.

**ATHOS**, ä'tŏs'. The *nom-de-guerre* of a character in Dumas's *Musketeer* romances, whose real name in the story was the Comte de la Fère. He is one of the three guardsmen with whom D'Artagnan associates himself—the husband of the infamous "Miladi," and father of the Vicomte de Bragelonne, who gave his name to the last book of the trilogy.

**ATHWART', ATHWART'SHIP.** See BEARING.

**ATHYR**, ä'thĭr. See ATHOR.

**ATITLAN**, ä'tē-tlän'. A lake situated in the department of Solola, Guatemala, 4700 feet above the sea level, over 24 miles long and 10 miles wide, with a circumference of 64 miles (Map: Central America, B 3). It has a depth of more than 1000 feet, is surrounded by steep declivities, and has no visible outlet, though many small streams flow into it. At its southern end is the large inactive volcano Atitlan, 11,849 feet high.

**ATITLAN**, or **SANTIAGO DE ATITLAN**, sän'tē-ä'gō dā ä'tē-tlän'. An Indian town situated on the south side of the mountain lake of Atitlan, in the department of Solola, Guatemala, 49 miles west of the city of Guatemala. It has mineral springs, and cotton spinning and fishing occupy the majority of the inhabitants. Pop., 9000.

**ATKARSK**, ät-kärsk'. The capital of a district, 50 miles northwest of Saratov, in the government of Saratov, southeast Russia; near the junction of the Medvieditza with one of its feeders. It carries on a brisk trade in grain.

Pop., 1897, 9750. The settlement of Etkara was mentioned as early as the fourteenth century.

**AT'KINSON,** EDWARD (1827–1905). An American economist. He was born in Brookline, Mass., and was educated in private schools. For many years he managed manufacturing companies and afterward conducted a fire insurance company for the mutual insurance of factories. He invented the "Aladdin oven," an improved cooking apparatus. He contributed extensively to the periodicals and published many pamphlets and books on economic subjects, banking, railways, cotton manufactures, the tariff, money, fire prevention, and the nutritive value of foods. During and after the presidential campaign of 1900 he was an active opponent of the administration's policy of expansion. Among his more extended works are: *The Distribution of Products* (1885); *The Industrial Progress of the Nation* (1889); *The Science of Nutrition* (10th ed., 1898); *The Prevention of Loss by Fire; Fifty Years Record of Factory Mutual Insurance* (1900); *Facts and Figures the Basis of Economic Science* (1904). Consult T. W. Higginson, biographical notice in *Proceedings of the American Academy of Arts and Sciences* (Boston, 1907).

**ATKINSON,** ELEANOR (STACKHOUSE). An American author, born at Rensselaer, Ind. She was educated at the Indianapolis Normal Training School, for several years taught in the schools of Indianapolis and Chicago, and from 1889 to 1891 was a special writer for the *Chicago Tribune* under the pen name of "Nora Marks." In the latter year she married Francis Blake Atkinson of Chicago. She edited *The Little Chronicle* in 1900–07. Her published books include: *Mamzelle Fifine* (1903); *Boyhood of Lincoln* (1908); *Lincoln's Love Story* (1909); *The Story of Chicago* (1910); *The Students' Reference Work*, vol. v (1911); *Greyfriars Bobby* (1912); *Loyal Love* (1912); *How and Why Library* (1913).

**ATKINSON,** GEORGE FRANCIS (1854—). An American botanist. He was born at Raisinville, Monroe Co., Mich., received his education at Olivet College, Mich., and at Cornell University, and was made assistant professor of general zoölogy and entomology at the University of North Carolina in 1885 and associate professor of botany and zoölogy there in 1886. Two years later he became professor of the same subjects in the University of South Carolina, and botanist of the experiment station. In 1889 he was appointed professor of biology at the Alabama Polytechnic Institute and at the Agricultural and Mechanical College of Alabama, and in 1892 was appointed assistant professor, and afterward professor, of botany at Cornell, where he became head of the department in 1906. In 1896 he was elected vice president of the American Association for the Advancement of Science, and in 1907 president of the Botanical Society of America. For two years he was associate editor of the *Botanical Gazette*. His publications include several excellent text-books and treatises, such as *Studies of American Fungi* (2d ed., 1903); *College Text-Book of Botany* (1905); *Botany for High Schools* (1910; 2d ed., 1912); *Practice Key and Flora of the Eastern, Northern, and Central States* (1912).

**ATKINSON,** GEORGE WESLEY (1845—). An American writer and politician, born in Charleston, W. Va. He studied at Ohio Wesleyan, and at Howard University (D. C.), and was admitted to the bar in 1875. From 1876 to 1880 he was United States internal revenue agent, and from 1881 to 1885 United States marshal in West Virginia. He was a member of the Fifty-first Congress (1889–91), and Governor of West Virginia from 1897 to 1901. After having served as United States Attorney for four years, he was appointed judge of the United States Court of Claims in 1905. He is author of *History of Kanawha* (1876); *After the Moonshiners* (1879); *Handbook for Revenue Officers* (1881); *ABC of the Tariff* (1882); *Prominent Men of West Virginia* (1895); *Psychology Simplified* (1897); *Public Addresses* (1901); *Chips and Whetstones* (1908).

**ATKINSON,** JOHN (1835–97). An American preacher. He was born at Deerfield, N. Y., and served in the ministry of the Methodist Episcopal church till his death at Haverstraw, N. Y. He wrote the familiar hymn, "We shall Meet beyond the River," and the historical works, *Memorials of Methodism* (1860); *The Centennial History of American Methodism* (1884); *The Beginnings of the Wesleyan Movement in America, and the Establishment therein of Methodism* (1896).

**ATKINSON,** JOHN CHRISTOPHER (1814–1900). An English clergyman and antiquary. He was born at Goldhanger, in Essex, where his father was curate. In 1838 he graduated B.A. from St. John's College, Cambridge, and three years later was ordained curate of Brockhampton in Herefordshire. In 1847 he became vicar of Danby, in the North Riding of Yorkshire, where he resided till his death. In 1887 he received from Durham University the degree of D.C.L., and in 1891 he became a prebendary in York Cathedral. A delightful antiquary somewhat after the type of Gilbert White (q.v.), he is best known for his *Forty Years in a Moorland Parish* (1891). Among his other popular books are: *The Walks, Talks, Travels, and Exploits of Two Schoolboys* (1859); *Play-Hours and Half-Holidays* (1880); *British Birds' Eggs and Nests* (1861); and *The Last of the Giant-Killers* (1891). Among his learned works are: "A Glossary of the Dialect of the Hundred of Lonsdale," in *Transactions of the Philological Society* (1867); *A Glossary of the Cleveland Dialect* (1868) with *Additions* (1876); *The History of Cleveland* (incomplete, 1872–77). He also edited for the Surtees Society *Cartularium Abbathiæ de Whiteby* (1879) and *Cartularium Abbathiæ Rievalle* (1889).

**ATKINSON,** THOMAS WITLAM (1799–1861). An English artist and traveler. He first devoted himself to architecture, but afterward traveled extensively in western Siberia and published accounts of his travels in works beautifully illustrated by himself. The works are entitled *Explorations in Oriental and Western Siberia* (1858) and *Travels in the Regions of the Upper and Lower Amoor* (1860).

**AT'KYNS,** Sir ROBERT (1621–1709). An English jurist and Lord Chief Baron of the Exchequer. He was descended from a family of distinguished lawyers, no less than four successive generations being represented in high judicial office. In 1659 he entered Richard Cromwell's Parliament as member for Evesham and was evidently of the King's party, as he was made Knight of the Bath at Charles's coronation (1661). He became judge of the Court of Common Pleas in 1672, but, owing to his

collision with the notorious Chief Justice Scroggs and his sturdy independence in urging the right of petition, was forced to resign his office in 1680. During his retirement he continued his agitation against the arrogant pretensions of the Stuarts and acted as legal adviser to the lords after the flight of James II. When the case against Lord William Russell was instituted in 1683, Atkyns published two powerful pamphlets to establish the innocence of that nobleman. Upon the accession of William III he succeeded his brother Edward as Lord Chief Baron of the Exchequer, a position which he held until 1694. From 1689 to 1693 he was Speaker of the House of Lords. His *Parliamentary and Political Tracts* (1734) constitute a valuable contribution to the history of the time.

**ATLAN'TA.** The capital of Georgia, and the county-seat of Fulton County, 171 miles by rail west by north of Augusta and 294 miles by rail northwest of Savannah (Map: Georgia, B 2). It is popularly known as the "Gate City," is the largest city in the State, and one of the important railroad centres of the South. It lies at the base of the Blue Ridge, near the Chattahoochee River, and has an elevation of 1000 to 1100 feet above sea level and a healthful climate with a mean annual temperature of about 60° Fahrenheit. The city possesses a fine public library, the State Library with over 80,000 volumes, a valuable geological collection, and numerous educational institutions. It is the seat of the Georgia School of Technology (founded in 1888), a branch of the State University at Athens; Atlanta University, founded in 1869; Clark University (Methodist Episcopal), established in 1870; Atlanta Baptist College, organized in 1867; and two medical schools. Among the more important buildings are the State Capitol, courthouse, city hall, custom house, opera house, Piedmont, Kimball, Georgian Terrace, Ansley, Winecoff, and Aragon hotels, and a Carnegie library. Other points of interest are Grant and Piedmont parks, the latter being the site of the Atlanta Exposition of 1895. In the vicinity of the city is Fort McPherson (q.v.), a government army post.

Atlanta carries on a large export trade in cotton, tobacco, grain, horses, and mules, its mule market being the second in importance in the United States. The products of its industrial establishments include cotton goods, cotton-seed oil, bags, furniture, machinery, fertilizers, patent medicines, flour, lumber, and planing mill products, and agricultural implements.

The government is administered under a charter of 1874, revised several times since. It provides for a mayor, who holds office for two years, and a bicameral municipal council; the board of aldermen, consisting of 10 members elected at large for three years, and the council of 20 members, chosen for two years to represent the whole city, but chosen respectively by the 10 wards—two from each. Of the administrative officials, only the license inspector and city warden are appointed by the executive, the municipal council controlling appointments to all other offices except the following, which are filled by popular election: attorney, commissioner of public works, engineer, tax collector, treasurer, and sexton. The annual income and expenditures of the city balance at about $3,500,000; the principal items of expense being $325,000 for the police department (including amounts for police courts, jails, etc.), $250,000 for the fire department, $450,000 for the health department (including amounts for street cleaning and sprinkling, and garbage removal), and $550,000 for schools. Atlanta owns its water works which for the year 1913 yielded the city a revenue of $485,000 against a total cost of $262,000 for the year's maintenance.

Pop., 1850, 2572; 1870, 21,789; 1890, 65,533; 1900, 89,872, including 2500 persons of foreign birth and 35,900 of negro descent; 1910, 154,839; 1920, 200,616. The first settlement was made here about 1839, and was called Terminus, from its being the intended terminus of the Georgia Railroad, completed in 1845. In 1843 it was incorporated as a town under the name Marthasville, and two years later the present name was adopted, while in 1847 a city charter was secured. Atlanta's growth was very rapid, its population being about 15,000 in 1861, and, from its admirable location, it became, at the outbreak of the Civil War, one of the most important cities in the Confederacy, being used as a depot for supplies and a rallying-place for recruits. In 1864 it was the objective point of General Sherman's campaign from Chattanooga. (See CIVIL WAR IN AMERICA.) The Federal army approached the city in July, and after fighting the battle of Peachtree Creek (q.v.), on July 20, closely invested the Confederate works. On July 22 the battle of Atlanta was fought southeast of the city, Hood, the Confederate general in command, making a bloody but unsuccessful attack on Sherman's extreme left under McPherson, who was killed early in the engagement. The Federal loss in killed, wounded, and prisoners in the battle in and around Atlanta was about 20,000; the Confederate, never accurately determined, was probably as great as 15,000. On the 28th another severe engagement, the battle of Ezra Church, was fought west of the city, Hood again attacking, and being again repulsed, the Federals losing about 600 and the Confederates about 4500. Meanwhile Sherman had kept up an almost continual bombardment, and on September 1, by a flank movement, compelled Hood to evacuate, the Federals taking possession on the following day. Here he stayed until November 15, when he started for Savannah, on his famous march to the sea. Atlanta was almost totally destroyed; but after the war it was quickly rebuilt and grew with great rapidity. In 1878 it became the capital of Georgia, and in 1895–96 the celebrated Cotton States and International Exposition was held here. For Atlanta during the Civil War, consult Jacob D. Cox, "Atlanta" (New York, 1882), in the *Campaigns of the Civil War Series;* and for the general history of the city, W. P. Reed (editor), *History of Atlanta* (Syracuse, 1889).

**ATLANTA EXPOSITION,** or COTTON STATES AND INDUSTRIAL EXPOSITION. An exhibition held in Atlanta, Ga., from Sept. 18 to Dec. 31, 1895, having for its chief purpose the presentation of the agricultural, manufacturing, and mineral resources of the southern States. The site selected was Piedmont Park, about 2 miles from the centre of the city, and covered an area of 189 acres, on which over 30 buildings, mostly in the Romanesque style of architecture, were erected. Numerous congresses were held during the Exposition, and to nearly every day was assigned some important feature that attracted special visitors. Among these were: Georgia Day, Confederate Day, Negro Day, etc.

A Department of Awards, presided over by Daniel C. Gilman, president of the Johns Hopkins University, viewed the exhibits during the two weeks between October 15 and November 1. The total attendance was 1,179,889, and the cost of the Exposition was $960,930, while the receipts from the admissions were $500,000, from concessions $125,230, and from floor space $79,000.

**ATLANTA UNIVERSITY.** A non-sectarian institution for the colored at Atlanta, Ga., opened in 1869. It was originally aided by the Freedmen's Bureau and the American Missionary Association, but soon became undenominational and independent. The university property, including buildings, is valued at about $285,000, and there is an endowment of $100,000. Collegiate, normal, and high school departments are maintained, and emphasis is also placed upon industrial training, the education of kindergarten teachers, and sociological work. In 1912–13 the officers and instructors numbered 34 and the students 404. The library had 15,000 volumes. President, Edward Twichell Ware, A.B.



**ATLANTES,** ăt-lăn'tēz (Gk. nom. pl. Ἄτλαντες; see ATLAS). Carved male figures used in architecture as supports to cornices, architraves, etc. They correspond to the female Caryatides, but were not so popular in Greek art. Examples are in the temple of Zeus at Girgenti, the theatre at Athens, in minor parts of mediæval decorative work, and especially, on a large scale, in late Renaissance buildings; sometimes called "Telamones."

**ATLAN'TIC.** A city and the county-seat of Cass Co., Iowa, 82 miles west-southwest of Des Moines, on the Chicago, Rock Island and Pacific Railroad (Map: Iowa, B 3). It has a large corn-canning factory, machine shops, and other manufactures. Atlantic was incorporated in 1869; by the existing charter the mayor holds office for two years and the city council consists of six members. The electric light and water plant is owned by the city. Pop., 1890, 4351; 1900, 5046; 1910, 4560; 1913 (est.), 5600.

**ATLANTIC CA'BLE.** See ATLANTIC TELEGRAPH, HISTORY OF.

**ATLANTIC CITY.** The most popular seaside resort in the United States, situated on a long, narrow, sandy island, known as Absecon Beach, in Atlantic Co., N. J., 56 miles by rail southeast of Philadelphia, and about 95 miles (direct) southwest of New York; on the Pennsylvania and the Reading railroads (Map: New Jersey, D 5). The island, three-quarters of a mile wide, stretches for 10 miles along the coast and is separated from the mainland by four or five miles of meadows, partly covered with water at high tide, and by a narrow strait. Absecon Lighthouse, 167 feet high, is on the north end of the beach. The city's most distinctive feature is the unique "Board walk" (built of steel and concrete with board flooring), which skirts the ocean for 8 miles, and forms a charming promenade. It is the centre of the resort's activities. Along its land side are situated stores of almost every kind, a great many places of amusement, many playhouses, and a score of fine hotels. Extending seaward are six great ocean piers, devoted exclusively to recreation. The best known of these is Young's "Million Dollar Pier." The boating and bathing facilities are excellent. During the season about 90,000 persons enjoy the surf daily. Fishing and shooting are other popular amusements. The city has a fine country club and abounds in hotels, boarding houses, and private cottages for the accommodation of visitors. It also contains a Carnegie library, a hospital, the Mercer Memorial Home for Invalid Women, and the Children's Seashore Home. The government is administered by five commissioners, elected for four years, and restricted by the referendum and recall. The water works are owned and operated by the municipality.

A few settlers came to the site as early as 1780, but there were only seven houses standing in 1852, and the existence of the city and summer resort really dates from the completion of the Camden and Atlantic Railroad in 1854, when the name "Atlantic City" was first adopted. On April 3, 1902, the city suffered from a disastrous fire, which destroyed several hotels and smaller buildings, and part of Young's Pier, a loss estimated at $500,000. Pop., 1900, 27,838; 1910, 46,150; 1920, 50,682. During the summer the transient population varies, but it is estimated at between 300,000 and 400,000.

**ATLANTIC HIGHLANDS.** A borough and seaside resort, in Monmouth Co., N. J., 20 miles south of New York, on Sandy Hook Bay and the Central Railroad of New Jersey (Map: New Jersey, E 3). It has beautiful residences and drives, a casino, yacht and tennis clubs, and numerous resort amusements. The borough owns its water works and electric light plant. It was settled in 1880 and incorporated in 1887. Pop., 1900, 1383; 1910, 1645.

**ATLANTIC OCEAN.** An ocean so named from Atlas, probably because it was the sea beyond Mount Atlas in northwestern Africa. It lies to the west of the great land masses of the Old World, and extends from the Arctic to the Antarctic regions. It is bounded on the east by Europe and Africa and on the west by the two Americas. On the north it connects with the Arctic Ocean by a channel which is as broad as the narrower parts of the main body of the ocean, but which is itself obstructed by islands, of which Greenland is the largest. Greenland lies to the west of the main connecting channel, which is obstructed by Iceland. On the south the Atlantic extends as far as the Antarctic Continent, but no natural line of demarcation here separates it from the Pacific or the Indian oceans, with both of which it communicates freely. A line, 560 miles long, connecting Tierra del Fuego at the southern end of South America with the South Shetland Islands off the coast of West Antarctica, and the twentieth meridian east of Greenwich between Cape Agulhas at the southern end of Africa and the Antarctic Continent (length, about 2500 miles) are therefore generally taken to be the boundaries which separate the Atlantic from the Pacific and the Indian oceans, respectively. A Southern, or Antarctic, ocean is no longer recognized, since the existence of an Antarctic land mass has been established. The waters surrounding the Antarctic Continent are divided up among the three oceans along the lines just mentioned. The length of the Atlantic between these north and south

boundaries is over 13,000 miles; the breadth averages perhaps something over 3000 miles, being less than 1800 miles in the narrowest place in the middle Atlantic between Sierra Leone, on the west coast of Africa, and Cape São Roque, on the east coast of South America. By the protrusion of the two continents in the equatorial zone the Atlantic is divided into two basins, the North and the South Atlantic.

The whole complex of waters constituting the Atlantic may be divided into two parts: (1) the main body of the ocean itself, and (2) the seas which are branches of it. To the latter belong the Arctic Ocean, the deep European Northern Sea (between Greenland and Norway on the one hand and Ireland-Faroe-Orkney and Spitzbergen-Bear Island on the other), the shallow Barents Sea, Hudson Bay, the Gulf of St. Lawrence, the North Sea, the Baltic, the American Mediterranean (Gulf of Mexico and Caribbean Sea), and, finally, the European Mediterranean (including the Black Sea). The area of the whole Atlantic basin is about 41,000,000 square miles—more than one-fifth of the earth's surface and three-tenths of the water surface of the globe—that of its main body 31,600,000 square miles (77 per cent) and that of its branches 9,400,000 square miles (23 per cent). The eastern and western borders are irregular in outline, but are peculiarly parallel, the embayment of the North Atlantic between Newfoundland and the Lesser Antilles corresponding to the northeastern projection of Africa, and the northwestern projection of South America to the wide expanse of the Gulf of Guinea in the South Atlantic. The main groups of islands in the Atlantic are the American Arctic Archipelago, Greenland, Iceland, and Spitzbergen at the north, the British Isles at the northeast, Newfoundland at the northwest, and the West Indies in the west-central part. The Atlantic, including all its connecting inland seas, receives most of the drainage of northeastern central, and southern North America, practically the whole of South America, most of Europe, except the eastern portion (Volga), and most of Africa except the southeastern part (Zambezi).

From the edge of the continental shelf, or platform, as that part of the continental land masses is termed which is submerged to a depth of 600 feet below the sea, the Atlantic basin generally deepens rapidly to depths of 10,000 to 13,000 feet. The main body of the Atlantic varies between 10,000 and 18.000 feet in depth; 13,000 feet may be considered the average depth of the ocean floor. The most conspicuous feature of the submarine relief of the Atlantic is a long, narrow ridge which extends throughout its whole length approximately midway between the eastern and western continents in the shape of the letter S. This coincidence with the general shape of the basin itself, together with the striking parallelism, mentioned above, of the western and eastern shores of the Atlantic, seems to indicate that these are major features in the structure of the earth's crust, although we are still ignorant of their details. In the North Atlantic this central ridge rises to within 13.000 feet of the surface, in the South Atlantic to within 10,000 feet; to the east and west of it lie depths of 16,000 to as much as 20,000 feet. The most marked depressions in the floor of the Atlantic are the Porto Rico Trough, north of Porto Rico, with a maximum known depth of nearly 28,000 feet—the greatest yet recorded in the Atlantic—and the Romanche Deep, on the equator and in 18° W. long., with a maximum depth of over 24,000 feet.

The surface salinity of the main body of the Atlantic reaches its maximum in two elliptical areas—the one, in the North Atlantic, lying along the Tropic of Cancer with its nucleus nearer the African coast; the other, in the South Atlantic, lying north of the Tropic of Capricorn nearer the South American coast. The salinity here amounts to from 3.70 to 3.75 per cent. From these two areas the salinity decreases to about 3.40 per cent both toward the equator and the poles. The highest salinity within the confines of the Atlantic occurs in the eastern Mediterranean, where it exceeds 3.90 per cent.

The temperature on the ocean floors is about 35° F. in the North Atlantic, 35° to 37° in the equatorial regions, 32° to 34° in the western part of the South Atlantic, and 34° to 36° in the eastern part. The distribution of average surface temperatures shows a displacement to the north, inasmuch as the line of maximum temperature (81° F.) does not coincide with the equator, but extends from the Caribbean southeastward and eastward along 5° N. to the African coast. The 68° isotherm in the north lies in about 35° N. lat., in the south in 30° S. lat.; the 50° isotherm in the North Atlantic extends as far as 60° N. lat. on the European side, while in the South Atlantic it does not go beyond 46° S. lat. In the north the 32° isotherm extends from Denmark Strait, between Greenland and Iceland, northeast to beyond 80° N. lat., and then recurves around the western and southern coast of Spitzbergen until it reaches Barents Sea. In the south this isotherm lies in general as far north as 55° S. lat. The surface temperatures follow the changes in atmospheric temperature, but vary much less in amount. The decrease in temperature with the depth of the water is, in lower latitudes, very rapid for a short distance below the surface; but below a depth of from 1800 to 2400 feet the change in temperature is slight.

The surface waters of the North Atlantic and the South Atlantic have each independent circulatory systems. The Gulf Stream takes its origin from the offshoot of the South Equatorial Current, which flows northwest along the northern coast of Brazil and the Guianas. Reinforcing the westward-flowing North Equatorial Current, it enters the Caribbean through the Lesser Antilles (while a branch, the Antillean Current, flows along their outer side), is forced into the Gulf of Mexico through the narrow Yucatan Channel and out again through Florida Strait, whence it flows along the eastern coast of the United States and thence along the fortieth parallel. In about 40° W. long. it loses its individuality and is merged with the general eastern surface drift. This latter spreads and divides, one branch of it flowing northward along the western coast of northern Europe, there, above latitude 70°, to join the colder currents flowing to the west; the other branch of it flowing, as a relatively cold current, southward along the western coast of Portugal and that of northern Africa; here, below lat. 20° N., it joins, where it is known as the Canary Current, the warm westward North Equatorial Current, and forms, between lat. 10° and 45° N., a clockwise-moving circulatory system. Off the western shores of the Atlantic the cold Arctic

Current flows southward from the north (called the Greenland Current on the coast of Greenland and the Labrador Current farther south), part of it branching off toward the east about lat. 50°, and forming a return current, completing another counter-clockwise system of circulation between lat. 45° and 60° N.

In the South Atlantic there appears to be but a single great circulatory system, moving in a counter-clockwise direction. The South Equatorial Current flows westward across the Atlantic in the region of the equator, but on reaching the northeastern corner of South America in long. 34° W., it separates, the northern branch moving toward the northwest along the north Brazilian and Guiana coast toward the Gulf of Mexico, and the southern branch moving toward the southwest and forming the Brazilian Current along the eastern coast of Brazil. It turns eastward beyond lat. 40° S. and joins the cold West Wind Drift, whose northeastern-flowing waters probably emanate from the Weddell Sea. As the coast of Africa is approached, a part of this current turns northward and flows along the southern part of the western coast of Guinea, where it is known as the Benguela Current, to join again the westward current across the Atlantic near the equator. From it a current detaches itself to the right, which flows east along the Guinea coast and is known as the Guinea Current. In the southwest corner of the circulatory system of the South Atlantic the cold Falkland Current enters from the strait between Tierra del Fuego and West Antarctica and flows north between the Patagonian coast and the western side of the Brazil Current. These various oceanic currents range in velocity from 20 to 75 miles per day.

The northern Atlantic lies in the path of the great procession of cyclones and anti-cyclones of middle latitudes, and also in the path of the West Indian hurricanes over its lower latitudes; the counterparts of these atmospheric disturbances are found in the South Atlantic. The winds of the Atlantic are divided into two corresponding systems—one in the North and one in the South Atlantic. In January and February, in the North Atlantic, north of lat. 35°, the winds are chiefly from the west; they are northwest on the North American coast, west toward the middle, and southwest on the European coast; but between Iceland and Greenland they are from the northeast. South of about lat. 35° N. the winds are generally from the northeast (the northeast trade winds) almost to the equator. In the South Atlantic, north of lat. 20° S. in the western part, and north of lat. 35° S. in the eastern part, the winds are from the southeast (the southeast trade winds), becoming more distinctly from the south just at the equator. In lat. 30° S. the winds are from the south on the eastern side and from the north on the western side; but southward of lat. 40° S. they are in general from the west. In July and August the dividing lines between the wind systems of the North and South Atlantic are pushed farther northward by from 10° to 15°.

The mean annual rainfall over the Atlantic Ocean is dependent on the wind systems. The regions of the northeast and southeast trades—the former the westward extension of arid region of the Sahara, the latter projecting northwest from the west coast of South Africa across to the northeast corner of South America—are extremely deficient in rainfall (10 to 30 inches). Between the two trade-wind zones lies the equatorial belt of high rainfall (40 to 80 inches and more). The region of the prevailing westerlies has moderate rainfall (40 inches) both in the North and the South Atlantic.

The vegetable and animal life of the Atlantic is treated under the subject OCEAN LIFE.

The distribution of algæ is dependent on the light and temperature of the water, and so rapid is the decrease of the former that below a depth of from 800 to 1000 feet few algæ are found; those in the surface waters belong mainly to the Fucaceæ, and those at greater depths are mainly Ceraminaceæ. The chief feature of the flora which can receive mention here is the great Sargasso region between lat. 24° and 30° N. and long. 40° and 80° W. on the west side of the circulatory system of the North Atlantic, where the seaweed *Sargassum baccifer-rum* is found in such great abundance as to interfere in some places with the progress of sailing vessels.

The distribution of mammalia, fishes, and floating mollusks is determined largely by the temperature of the surface waters. Of the Cetacea, some species of whales are distributed over various sections of the Atlantic Ocean, but those found in polar regions do not descend to lower latitudes, and vice versa.

The ocean bottom, near the coasts, is covered with a great variety of deposits of continental waste. The greater portion—that between depths of 3000 and 12,000 feet—is, however, covered with Foraminiferæ (*Globigerina, Orbulina, Pulvinulina, Sphæroidina*). At these latter depths the calcareous bottom is replaced by gray clay, which forms a transition region between the foraminiferan ooze and the red clay of the greater depths below 14,000 feet, which consequently covers a large area. The flora and the fauna of the regions of the Atlantic visited by the *Challenger* are given in minute detail in the *Report of the Challenger Expedition*, prepared under the direction of C. Wyville Thomson and John Murray (London, 1880–95). See OCEAN; OCEANIC DEPOSITS; DISTRIBUTION OF ANIMALS.

**Bibliography.** The leading general work is *Geographie des Atlantischen Ozeans* by G. Schott (Hamburg, 1912), which discusses, besides the physical features, the discovery and exploration and the transportation and commerce of the Atlantic Ocean. It is accompanied by a bathymetrical map on the scale of 1: 30,000,000. Similar representations are found on the *Carte générale bathymétrique des océans*, ed. by J. Thoulet, Inst. Océanoger. de Monaco, and the *Tiefenkarte des Atlantischen Ozeans*, 1 : 40,000,000, by M. Groll (Versölent. Inst. Meereskunde, Berlin, Series A, No. 2, 1912). Current meteorological conditions are represented on the monthly Pilot Charts of the North and the South Atlantic Ocean published by the United States Hydrographic Office, Washington, D. C.

**ATLANTIC TELEGRAPH, HISTORY OF THE.** The first definite suggestion of telegraphic communication between England and America dates from 1845, when the Messrs. Brett, who a few years later were active in the construction of the first telegraph lines across the English Channel, registered a "General Oceanic Telegraph Company." Before proceeding with this enterprise they laid a cable across the English Channel (1851), the success of which and

other European cables led to the discussion of telegraphic communication between America and Europe by way of Newfoundland. The original plan was to carry the line across that island to St. John's and there intercept the incoming steamers and, by means of carrier-pigeons and a direct telegraph line to the United States, transmit messages. The coöperation of Cyrus W. Field was enlisted in 1854, and he became interested not only in this scheme, but also in a project of a transatlantic cable, which he pushed with vigor. The government of Newfoundland conferred on the company exclusive rights of landing a cable upon its coast, and privileges were also obtained from the governments of Prince Edward's Island, Canada, and the State of Maine. An unsuccessful attempt to lay a cable across the Gulf of St. Lawrence was made in 1855, but in the following year this work was accomplished satisfactorily and one link in the chain completed. The next question was that of the main cable from Newfoundland to Ireland along a route which had previously been surveyed by American and British war vessels, and which, on account of its comparatively shallow depth, was called the Telegraphic Plateau. Extensive tests meanwhile were made to determine the character of the cable, and the many problems involved were discussed with interest by eminent engineers and electricians, many of whom declared the laying and operation of the cable to be impossible.

Through the efforts of Mr. Field, and with the aid of Liverpool and London capitalists, the Atlantic Telegraph Company was formed, with a capital of £350,000, and assistance in the form of subsidies (£14,000 per annum during the operation of the cable was promised by Great Britain); and ships for laying the cable were secured from the governments of Great Britain and the United States. In the first board of directors were William Thomson, who was the electrical engineer of the company, and John Pender; the former, afterward Lord Kelvin, becoming widely known in the scientific world, while the latter was subsequently interested in the construction and laying of many ocean cables. The conductor, which was prepared under certain specifications, consisted of seven fine copper wires, each of No. 22 gauge, twisted together so as to form a cord which was one-twelfth inch in thickness, and weighed 107 pounds per nautical mile. This was covered with three layers of gutta-percha, over which was a coating of hempen yarn saturated with pitch, tar, beeswax, and boiled linseed oil. The sheathing consisted of 18 strands, each formed by seven No. 22 iron wires, making the entire cable about six-tenths inch in diameter, and its weight one ton to the mile.

This cable, when completed, was divided in two equal portions, and loaded on the U.S.S. *Niagara* and H.M.S. *Agamemnon*, which were loaned for this purpose by the respective governments and suitably equipped. A start was made from Valentia, a port on the west coast of Ireland, on Aug. 6, 1857, and the cable was paid out from the *Niagara* until a break occurred and the end was lost. The vessels returned to Plymouth, where the cable was stored and protected. Additional capital was raised by the company, 700 miles of new cable constructed, and another attempt was essayed in the following year. Instead of laying the cable directly from the Irish coast, the *Niagara* and *Agamemnon* proceeded to mid-ocean, where they joined the ends of their respective cables and then steamed in opposite directions. Again misfortune attended the expedition, and owing to a double break 144 miles of cable were lost. Notwithstanding these mishaps, another start was made July 17, and on July 29, 1858, the two vessels separated. As a result of good fortune and careful management, they succeeded in landing safely the ends of the cable on the Irish and Newfoundland shores. On August 17 complete connections of the cable with the receiving instruments and land wires were made, and the following message was sent over the wire: "Europe and America are united by telegraph. Glory to God in the highest; on earth peace, and good-will toward men." Messages and replies from Queen to President, and between other officials followed, and the event was celebrated enthusiastically on both sides of the Atlantic. The station at Newfoundland was connected with the general telegraphic system of America, and that at Valentia with the British and European lines.

The commercial success of the Atlantic cable was early demonstrated, but, owing to the use of currents of too high potential, the cable soon became impaired, and after September 1 it was found impossible to transmit messages; while after October 20 no signals whatsoever passed over the cable. For several years there were no further attempts at laying an Atlantic cable; but Mr. Field was still active in furthering the enterprise and enlisting new capital. During this time a number of cables were laid in Europe and Asia, and improved methods of construction, testing, and operation were being developed. As a result of Mr. Field's efforts, more capital was subscribed, the company reorganized, and an improved cable, heavier and of greater conductivity, was manufactured. To lay this cable the steamer *Great Eastern* (q.v.), then and for many years the largest vessel afloat, was secured, and special cable-tanks and machinery fitted to it. On July 23, 1865, the *Great Eastern* sailed from Valentia and successfully laid over 1000 miles of the cable, which was under test for the entire trip. At this point, however, a break occurred, and the cable parted. Various attempts were made to pick up the cable with grappling appliances, which, though demonstrating the possibility of finding and raising to the surface a submerged cable, were not attended with success. For another attempt further capital was necessary, and the Atlantic Telegraph Company was practically amalgamated with the newly formed Anglo-American Telegraph Company. Again the *Great Eastern* set forth from Valentia, carrying not only a new cable of improved design, but also a sufficient length to complete the 1865 cable, which was to be recovered and a new length laid from the splice. In both attempts the engineers on the *Great Eastern* were successful, and on July 27 Heart's Content Harbor, Newfoundland, was entered, and the cable was soon landed and connected with the shore. The *Great Eastern* then returned to mid-ocean, and after a series of trials found the broken cable and completed the circuit to Newfoundland. With two working cables, the success of the enterprise was assured, and they were soon in steady use, the rate of transmission of messages improving with new apparatus and the increasing skill of the operators. In 1869 a French cable was laid from Brest to

Saint-Pierre, and four years later the Direct United States Cable Company was formed, and a cable laid across the Atlantic, landing at Torbay, Nova Scotia. This landing was subsequently abandoned, the cable lengthened and diverted to Halifax. This company was the first competitor of the Anglo-American Company, which in 1873 and 1874 laid new cables, again employing the *Great Eastern* for this purpose. In 1872 the 1866 cable broke down, and in 1877 the 1865 cable also, so that in 1880 another cable was laid, which was connected to the shore ends of the 1866 cable. In 1879 the Compagnie Française du Télegraphe de Paris à New-York laid a cable across the Atlantic, and in 1881 the American Telegraph and Cable Company, formed by Jay Gould, laid a cable, which was followed by a second in the following year. In 1884 the Commercial Cable Company, or Mackay-Bennett Company, as it was known from the names of its two chief owners, laid two cables, one of which was extended from Nova Scotia to New York. In 1894 another cable was laid for the Commercial Cable Company, and also a new one for the Anglo-American Company, giving the latter organization five working lines across the Atlantic Ocean. The longest telegraph cable to cross the Atlantic is that of the Compagnie Française des Cables Télégraphiques, which was laid in 1898 and extends from Brest to Cape Cod, Mass., being 3200 miles in length. It is one of the heaviest cables ever constructed, having 661 pounds of copper and 400 pounds of gutta-percha per nautical mile. In 1900 two cables were laid across the Atlantic, using the Azores as an intermediate station. One of these belonged to the Commercial Cable Company and extended from Fayal to New York, via Nova Scotia, making the fourth cable operated by this company. At Fayal direct connection is had with Europe by means of the Europe and Azores Telegraph Company's system. In the spring of 1900 the cable of the Deutsch-Atlantische Telegraphen-Gesellschaft was laid from Borkum to Fayal, and in the summer extended to New York, so that on August 31 Emperor William and President McKinley were able to exchange messages. Late in the year 1901 a cable from Waterville, Ireland, to Fayal, Azores, was laid by the Commercial Cable Company and successfully landed at the latter place on November 30. In 1904 the Deutsch-Atlantische Telegraphen-Gesellschaft completed a second cable from Borkum to New York; in 1905 a fifth cable, from Canso to Waterville, was completed by the Commercial Cable Company, at a cost of $3,500,000, which very appropriately can be compared with the contract price of the first Atlantic cable, $1,100,000. The difference is due to the greater conductivity, involving more weight in the core, and to the increased price of gutta-percha, the supply of which is stationary, if not diminishing.

In 1910 the Western Union Telegraph Company, which had previously extended from Nova Scotia to New York the two cables laid in 1881 and 1882 by the American Telegraph and Cable Company, laid a new cable of the heaviest and most improved type between New York and Bay Roberts in Newfoundland and between the last-mentioned point and Penzance in England. This cable was, in 1911, transferred to the Anglo-American Cable Company, and all the cables of the Anglo-American Company and the cable of the Direct United States Cable Company were leased by the Western Union Telegraph Company for a term of 99 years from April 1, 1911, making, with the two cables laid by the American Telegraph and Cable Company, a total of eight transatlantic cables operated by the Western Union Telegraph Company under the title "The Western Union Cable System." By 1913 three of these eight cables landed at Bay Roberts, and one of the Commercial Cable Company's cables had been transferred to St. Johns, Newfoundland, making a total of eight cables landed at Newfoundland, which has supplanted Nova Scotia as a landing point for transatlantic cables. In 1913 the Gott method for the direct transmission of Morse signals—dots and dashes—was used by the Commercial Cable Company.

Until 1911 the tolls on transatlantic cable messages had invariably been computed upon a word basis, both addresses and signature counted and charged for, but in December of that year the Western Union Cable System, following the precedent established by the land line system of the Western Union Telegraph Company in inaugurating the "Night Letter" service, involving the use of facilities which otherwise would be idle at night for communications of a semi-urgent character and of considerable length, announced a "Cable Letter" and "Week-End Letter" service under which a specified charge is made for a given number of words with small added charges for additional words. These new services were adopted by other companies, and because of their low cost (as low as 5 cents per word) at once became very popular for social and other communications of a non-urgent character.

Consult Bright, *Submarine Telegraphs* (London, 1898), a thoroughly systematic and historical work; Judson, *Cyrus W. Field: His Life and Work* (New York, 1896). See TELEGRAPHY, SUBMARINE, for description of instruments and methods.

**ATLAN'TIS** (Gk. Ἀτλαντίς, scil. *νῆσος, nēsos*, island). A large island, which, according to an ancient tradition, was situated in the Atlantic Ocean, over against the Pillars of Hercules. It is first mentioned by Plato, who, in the *Timæus*, represents an Egyptian priest as describing it to Solon. According to this account Atlantis was an island larger than Libya and Asia Minor combined. Nine thousand years before the time of Solon it had been a powerful nation and had been successfully resisted by the Athenians alone. It had finally been engulfed by the sea, which ever after remained unnavigable by reason of the shoal of mud which had been raised on the spot. In the *Critias* Plato gives a glowing description of the island and adds thereto its fabulous history. The account of Plato has been considered by some a pure invention of the author's imagination, while others have looked upon it as a real tradition. Various attempts have been made to identify the island. The Canary Islands, the Scandinavian Peninsula, and the American Continent have all been thought to be the land in question. The remains of a very ancient civilization in Crete, brought to light by recent archæological excavations, have led some to identify Atlantis with Crete in the Minoan period. This view is discussed in the London *Times* of Feb. 19, 1909. Atlantis is also the name of a romance by Ignatius Donnelly (1882). Consult Volquardsen, *Ueber die Mythen bei Plato* (Schleswig, 1871), and Steiner, *Submerged Continents of Atlantis and Lemuria* (Chicago, 1911).

**ATLAN'TOSAU'RUS.** See TITANOSAURUS.

**AT'LAS** (Ar. satin, smooth, from *talasa*, to make smooth). The name given to a silk satin manufactured in India and other eastern countries and at one time largely imported by European merchants. This material was wrought with threads of gold or silver, was either striped or flowered, and was woven in the most skillful manner, though it lacked the lustre of French silks.

**ATLAS** (so named from its sustaining the globe of the head, as the giant Atlas sustained the vault of heaven). The uppermost segment of the vertebral column; the first cervical vertebra. It differs from the other six in having no body or spinous process, being a mere irregular bony ring, partly divided into two unequal parts by a constriction; this division is completed by a ligament, the space in front being occupied by the tooth-like process of the second cervical vertebra (see AXIS) and that behind by the spinal marrow. On each side the ring is very thick; it is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat and rest on the second cervical vertebra. The atlas, with the occipital bone, forms the joint on which the head moves in nodding, and turns on the pivot of the second cervical vertebra when we look from side to side.

**ATLAS.** A mountain system of northern Africa, extending about 1500 miles in a southwest and northeast direction from the western end of Morocco to the eastern coast of Tunis, in the main parallel with the coast of the Atlantic and the Mediterranean (Map: Africa, D 1). These mountains are a part of the orographic system that extends in ranges parallel with them through the Iberian Peninsula to the Pyrenees, and all belonged to the same physical area till separated by the creation of the Strait of Gibraltar. The ranges may be divided into two parts, the Moroccan, or Western, and the Algerian, or Eastern, Atlas. The former comprises three chains—the Great Atlas in the middle, the Little Atlas on the Mediterranean coast, and the Anti-Atlas south of the Great Atlas. The Great Atlas is the longest range and contains the highest summits of the entire system, as the Jebel Ayashi (14,600 feet) and Tamjurt (14,500 feet). Its average height is over 11,000 feet, while the highest summits in Algeria and Tunis do not exceed 8000 and 6000 feet, respectively. The Anti-Atlas is less elevated and shorter than the main chain. The Little Atlas begins in about long. 7° W. and finally joins the coast ridge of the Rif. In the Algerian, or Eastern, Atlas only two chains are distinguished, separated by an elevated plateau interspersed with numerous saline marshes, called Shotts. The northern chain, Tell Atlas, is cut up by coast streams and deep valleys into several separate groups. The valleys are very fertile, highly cultivated, and are among the most favored regions of the Mediterranean basin. The highest summits are more than 7000 feet. The southern range, or Great Atlas, is very wide and sends off numerous spurs into the desert. It reaches in its highest peak, Shelia, an altitude of 7611 feet. In Tunis the Atlas system spreads out into a number of separate mountains of inferior altitude. The rocks composing the Atlas system comprise igneous and sedimentary rocks, which belong chiefly to the Archæan and Paleozoic periods. Jurassic, as well as more recent Tertiary formations, are also much in evidence. Copper, iron, salt, and several kinds of beautiful marble occur in the Atlas. Some of the summits are under snow for the larger part of the year, but even the highest peaks are usually without a snow cover in summer. Consult: P. Schnell, *L'Atlas marocain* (Paris, 1898); T. Fischer, "Ueber meine Reise im marokkanischen Atlas," in *Zeitschrift der Gesellschaft für Erdkunde*, vol. xxvi (Berlin, 1899); Louis Gentil, *Mission de Sagonzac* (Paris, 1906) and later writings; Joseph Thomson, *Travels in the Atlas and Southern Morocco* (London, 1889).

**ATLAS** (Gk. Ἄτλας). According to Hesiod's *Theogony*, one of the Titans, the son of Iapetus and Clymene, and brother of Menœtius, Prometheus, and Epimetheus. Apollodorus, however, says he was a son of Asia; Hyginus makes him a son of Æther and Gæa. The Pleiades were daughters of Atlas and Pleione, the Hesperides of Atlas and Hesperis; and countless noble houses in Greek legend traced their origin to the union of a daughter of Atlas with a god. Through all antiquity, from Homer onward, Atlas bears the heavens on his shoulders, and this is early declared a punishment for rebellion against Zeus, which story was later elaborated until Atlas became the leader of the Titans in their war against the gods. Atlas was always located in the far west, beyond the horizon; finally, he was localized in northwestern Africa. There he was a king, rich in flocks, owner of the gardens of the Hesperides. Atlas, as bearer of the heavens, appears in early Greek art on vases and reliefs in connection with Hercules' search for the apples of the Hesperides. In statuary Atlas is first represented by the Pergamene school; he is portrayed as carrying the heavens or the terrestrial globe. The plural, Atlantes, is applied in architecture to male figures serving as columns. In consequence of the ancient views, which made the vault of heaven rest on solid pillars or other supports, the name "Atlas," originally mythological and cosmogonic, was introduced into geography; it was given to a hill in northwest Africa. Mercator, in the sixteenth century, applied the name "Atlas" to a collection of maps, probably because the figure of Atlas supporting the heavens had been given on the title-pages of such works.

**ATLAS POWDER.** A high explosive dynamite (of great strength and destructive potentiality), used for mining, quarrying, driving tunnels, sinking shafts and wells, submarine blasting, removing wrecks, clearing ice gorges, road building, excavating ditches, in farming for removing stumps and boulders from new land, and subsoiling. It also has been used with great success for planting fruit and other trees. It consists of nitroglycerin, sodium nitrate, wood pulp, and a small quantity of chalk or other antiacid. The proportions are varied to fulfill the desired requirements as to strength and quickness. Like other varieties of dynamite, when not confined it will burn harmlessly; but when fired by a blasting cap it explodes with enormous force. It is put up in cartridges 6 and 8 inches in length and from ⅞ of an inch to 2 inches in diameter, containing from 20 to 75 per cent of nitroglycerin, according to the special use for which it is desired. The 40 per cent strength, put up in cartridges 1¼ inches in diameter and 8 inches long, is the most popular in strength and size, as it fulfills the greatest number of requirements. See EXPLOSIVES.

**AT'MOGRAPH** (*ἀτμός, atmos*, vapor + *γράφειν, graphein*, to write). A simple or self-recording instrument for measuring the amount of evaporation, usually of water, from water, from a vessel or other body. See ATMOMETER.

**ATMOM'ETER**, or EVAPOROMETER (Gk. *ἀτμός, atmos*, vapor + *μέτρον, metron*, measure). An instrument used to measure the amount of evaporation in the open air from a surface of water. It consists of a round dish supplied with an inclined scale to give a magnified reading of the differences in level caused by the evaporation. This loss can also be obtained by weighing the dish and water at the beginning and end of the experiment. The evaporation pan and still well of Marvin consists of a surface of water fed from a supply tank where the amount lost by evaporation can be measured. In the Piche evaporometer the evaporation is measured by the change in level of water in a vertical graduated glass tube closed at the upper end and open below. The tube is filled with water, and the open end is covered with a paper disk held in place by a metal clamp. The water is absorbed by the paper, from which it evaporates, and the amount is measured by taking the difference in readings on the scale. The paper surface gives off about one-third more water in a given time than an equal extent of surface of water in an open dish. The first instrument of this kind was constructed by Sir John Leslie, who employed a porous earthenware ball instead of the paper. Other modifications of this instrument have been employed by Livingston, and there is also the balance evaporimeter of Wild, when a pan of water is carried as the variable weight on a quadrant balance. The atmograph serves to produce an automatic record of the amount of evaporation. When the wind is blowing 5 miles an hour, the evaporation is 2.2 times as great as in a calm; at 10 miles, 3.8 times; 15 miles, 4.9 times; 20 miles, 5.7 times; 25 miles, 6.1 times; 30 miles, 6.3 times. Atmometers and other meteorological instruments will be found described in Russell, *Meteorology* (New York, 1899), a popular treatise; also by Marvin in *Monthly Weather Review* for 1909.

**AT'MOSPHERE** (Gk. *ἀτμός, atmos*, vapor + *σφαῖρα, sphaira*, sphere, globe). The name applied to the mixture of gases and vapors surrounding any climate or sun, but especially the envelope of our globe. Spectrum analysis tells us much about the constituent gases and vapors, and even the relative motion of these in the atmospheres of the earth, the sun, and the distant stars; we know, in general, that nearly all of the chemical elements that occur in those are also present either on our earth or in its own atmosphere. The principal constituents of the earth's atmosphere are oxygen and nitrogen, in the ratio of 21 to 78 respectively. The next most important constituent is aqueous vapor, the proportion of which varies from 5 per cent to nothing, depending upon the temperature and location of the sample of air that is analyzed. The other gases that are most commonly found are carbonic-acid gas, whose proportion varies slightly, but may be considered as being on an average 0.03 per cent and to this extent may be considered as a normal constituent; when this gas is in excess (as in many dwellings where the combustion of fuel or illuminating gas is not properly guarded, or when persons are gathered together without proper provision for ventilation) it is to be considered as an undesirable impurity. Traces of ammonia, hydrocarbons, and possibly ozone, are frequently encountered. The most interesting recent additions to our knowledge have resulted from our ability to cool and condense the air into a liquid form. By the fractional distillation of this liquid air, Rayleigh, Ramsay, Dewar, and others have shown the presence of gases whose densities, calling that of hydrogen 1 and oxygen 16, are as follows: helium, 1.98; neon, 9.97; argon, 19.96; kryptom, 40.88, and xenon, 64. These rare gases are exceedingly volatile, and their presence is held to indicate not that they belong to the earth's atmosphere, but that they are simply diffused through the whole interplanetary space, and are not held down to the earth's surface to any great extent by the attraction of gravitation. On the other hand, a larger body like our sun may have an attractive power sufficient to accumulate a larger proportion of some of these gases in its atmosphere. The accompanying figure and table recently calculated by Humphreys present the vertical change in composition of the atmosphere up to an altitude of 140 kilometers (87 miles). (Consult *Journal of the Franklin Institute*, March, 1913, pp. 212, 215.)

| Height in kilometers | Argon | Nitrogen | Water vapor | Oxygen | Carbon dioxide | Hydrogen | Helium | Total pressure in millimeters |
|---|---|---|---|---|---|---|---|---|
| 140 | ... | 0.01 | ... | .... | ... | 99.63 | 0.36 | 0.0040 |
| 130 | ... | 0 04 | ... | .... | ... | 99.55 | 0.41 | 0.0046 |
| 120 | ... | 0.19 | ... | . . | ... | 99.35 | 0.46 | 0.0052 |
| 110 | ... | 0.68 | 0.02 | 0.02 | ... | 98.77 | 0.51 | 0.0059 |
| 100 | ... | 2.97 | 0.05 | 0 11 | ... | 96.31 | 0.56 | 0.0067 |
| 90 | ... | 9.86 | 0.10 | 0 49 | ... | 88.97 | 0.58 | 0.0081 |
| 80 | . | 32.39 | 0 17 | 1.86 | ... | 65.11 | 0.47 | 0.0123 |
| 70 | 0.03 | 62.04 | 0.20 | 4.74 | ... | 32.73 | 0.26 | 0.0274 |
| 60 | 0.03 | 81.33 | 0.15 | 7.70 | ... | 10.69 | 0.10 | 0.0935 |
| 50 | 0.12 | 86.82 | 0.10 | 10.17 | ... | 2.76 | 0.03 | 0.403 |
| 40 | 0.22 | 86.43 | 0.06 | 12.61 | ... | 0.67 | 0.01 | 1.84 |
| 30 | 0 35 | 84.27 | 0.03 | 15.18 | 0.01 | 0.16 | ... | 8.63 |
| 20 | 0 59 | 81.24 | 0.02 | 18.10 | 0.01 | 0.04 | ... | 40.99 |
| 15 | 0 77 | 79.52 | 0.01 | 19.66 | 0.02 | 0.02 | ... | 89.66 |
| 11 | 0.94 | 78.02 | 0.01 | 20.99 | 0.03 | 0.01 | ... | 168.00 |
| 5 | 0.94 | 77.89 | 0.18 | 20.95 | 0.03 | 0.01 | ... | 405. |
| 0 | 0.93 | 77.08 | 1.20 | 20.75 | 0.03 | 0.01 | ... | 760. |

The chemical and physical properties of the earth's atmosphere are of vital importance to mankind. In a general way it is ordinarily stated that the stratified portion of the earth's crust, including the fossils, the coal beds, the oils, the gases, and all hydrocarbon compounds, as well as all the water contained in the rocks, the oceans, and lakes, represents an immense volume of oxygen, nitrogen, hydrogen, carbonic-acid gas, etc., that has been abstracted from the primitive atmosphere of the earth, which must therefore have at one time been very much greater than at present. It is supposed that at the present time the formation of new compounds and the disintegration of others on the earth's surface are going on at such a rate as to counterbalance each other, taking the earth as a whole, although there is probably no experimental or observational demonstration of this hypothesis. It is calculated that at the present time any excess of ammonia or carbonic-acid gas would be rapidly absorbed by the ocean water, resulting in the formation of precipitates that would accumulate at the bottom of the sea. In general, living plants absorb carbonic-acid gas from the air and give up oxygen to it, while ani-

mal life absorbs oxygen and gives up carbonic-acid gas. It cannot be shown that these two processes exactly counterbalance each other, but of course the tendency is in that direction. An appreciable portion of the atmospheric gases is held in solution by fresh and salt water, where it is utilized by plants and animals that live in the water.

A large part of the aqueous vapor in the atmosphere is retained for months on the earth's surface as solid snow or ice, while other portions, forming as rain or dew, either evaporate quickly or accumulate in lakes and oceans and the superficial strata of soil. But so far as is known, there is at the present time no special tendency toward a steady increase of snow on land or rain water in lakes and oceans, except possibly over the interior of Greenland and in the central portion of the Antarctic Continent, both of which regions are in a glacial condition similar to what must have prevailed over large portions of North America and Europe during the Glacial Period. The steady accumulation of a great mass of snow, and especially its periodical accumulations and evaporation, must disturb the earth's axis of rotation, producing periodic changes in latitude, such as are now going on even on a very small scale.

The physical properties of the atmosphere are as important as its chemical. The air becomes thinner as we ascend above sea level, owing to the fact that it is a compressible gas. The logarithm of the pressure due to the weight of the air above us diminishes in inverse proportion to our altitude above sea level; this logarithmic law (erroneously called the law of Boyle and Mariotte), which obtains only so long as the air is dense enough to be considered as a gas that obeys the law of Boyle, gives us for the actual density of the atmosphere at an altitude of 50 kilometers, or 31 miles, something less than the 1-7000 part of the density at the earth's surface; i.e., if there is a pressure of 760 millimeters at sea level, there will be a pressure of only 0.1 millimeter at 50 kilometers. At some elevation not much greater than this it is neces-

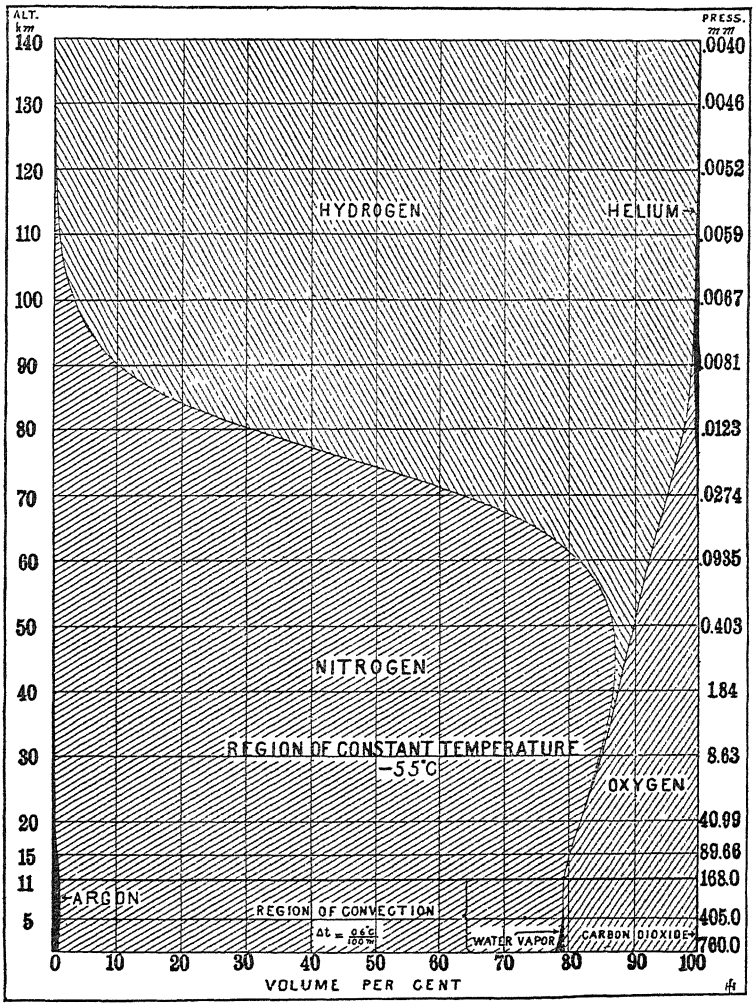



CHART SHOWING VARIATIONS IN CONSTITUENTS OF THE ATMOSPHERE AT DIFFERENT ELEVATIONS.

sary to consider each particle of air as a separate satellite, moving rather freely with other particles around the earth in orbits controlled by the general law of gravity, but modified by an occasional impact of one particle on the other. At the earth's surface these impacts occur with great frequency and control the phenomena or determine the properties of the gas; but at great altitudes the impacts have less importance, and the gas behaves so differently that it is sometimes spoken of as the ultra-gaseous state, or a fourth condition of matter, or a Crookes's vacuum, since the phenomena peculiar to this condition were first illustrated by Crookes in his vacuum tube. That particles of matter in some form permanently attend the earth at 100 miles above sea level, seems to be demonstrated by the behavior of shooting stars or aërolites, which enter the atmosphere at a velocity of 20 miles per second and are at once heated up to the burning point by striking the air in front of them; it is only when they descend to the lower atmosphere that they can be said to be heated and burned up by the heat evolved by the compression of the gas immediately in front of them.

The density of the atmosphere at the earth's surface is about the 1-800 part of that of water, varying from the 750th to the 850th with the ordinary variations in pressure and temperature. This slight density offers no appreciable resistance to the ordinary motion of men and quadrupeds, but makes it possible for birds and insects to fly. On the other hand, when the air itself is in motion, the breeze produces a pressure that has been utilized by mankind from the earliest ages to propel sailboats and ships and drive windmills, so that the atmosphere must be recognized as affording a motive power that has played a most important part in the development of the human race. In fact, the winds set in motion by the solar heat constitute a great "hot-air" engine. The fact that the atmosphere has weight was first maintained by Galileo and demonstrated by the experiments of Otto von Guericke in his air pump, and Torricelli with his mercurial barometer, but more especially by Pascal, who, at the request of Descartes, carried his barometer to the summit of Puy-de-Dôme, a mountain in central France. It is by virtue of this pressure that water ascends the bore of a pump when the piston is raised. The total mass of the earth's atmosphere has been calculated to be about 1-1,000,000 or 1-1,125,000 of the mass of the earth. (Consult the *Monthly Weather Review* for January, 1899, p. 58.)

As the atmosphere is a fluid, subject at any place to the pressure of all the air above it, it is not only compressed by this weight, but by its elastic reaction it presses outward in all directions with an equal force; consequently every substance that is immersed in the atmosphere is buoyed up to an extent equal to the weight of the air that it displaces. This buoyancy must be allowed for in all delicate weighings. If the object is a bag or a balloon full of hydrogen, hot air, or other very light gas, the upward pressure or buoyancy may be greater than the weight of the balloon; consequently the latter rises. (See AËRONAUTICS.) This principle gave rise, in the hands of Montgolfier, to the art of aërial navigation, the future of which now depends almost entirely upon our knowledge of the currents of air and our power to steer or guide the balloon.

The air is not a perfect gas, but has an internal friction called viscosity, by reason of which one layer of air sliding past another, experiences a drag, or retard, or resistance. Therefore any movement of one portion of the atmosphere over or through another portion soon ceases, unless an external force is continuously applied sufficient to overcome the viscosity. This viscous resistance increases with temperature, but is apparently independent of pressure; it is, therefore, greatest in the warmer portions of the globe and less at the poles, and may be zero at the outer boundary of the atmosphere.

The elastic pressure pervading a mass of quiet air is measured by the barometer; but if the air is in motion the barometer must move with the air, or else some device must be used in order to separate the elastic pressure from the pressure produced by the action of the wind on the barometer itself, considered as an obstacle to the wind. This matter will be found fully explained in Abbe, "Meteorological Apparatus and Methods," *Annual Report, Chief Signal Officer for 1887*, app. 46 (Washington, 1888). The observed pressure at any point on the earth's surface is subject to great changes from day to day, which are associated with the movements of the areas of high and low pressure attending fair weather and storms respectively; therefore the barometer can serve a useful purpose as an indicator of approaching changes of weather. The local pressure also goes through diurnal and annual periodic changes; formerly these were spoken of as waves of pressure, moving as such over the surface of the globe, but it is not necessary to commit ourselves to such an hypothesis before the true explanation of these variations has been discovered.

Another important physical property is the power of the air to absorb and radiate heat. The specific heat of the air when it is kept at a constant pressure is 0.2412, that of water being unity, and the specific heat, when kept at a constant volume, is 0.1721; the ratio of the two is 1.4011. This latter ratio affects the velocity of sound, and, in general, it determines the rate at which air will cool when it is allowed to expand without the addition of heat from extraneous sources. This so-called adiabatic expansion and cooling is the principle that is utilized in cooling the air to the liquid, or even solid state; it is also the principle that controls the cooling of ascending masses of air in the free atmosphere, by which the moisture contained therein condenses into cloud, rain, snow, or hail; this is, therefore, a property of great importance in meteorology.

The absorption of radiant heat by the atmosphere, especially the radiation from the sun and the earth, has been studied minutely, both with the spectroscope and the bolometer. Fraunhofer showed that the dark lines seen in the spectrum of a narrow beam of sunlight proceed mostly from absorption taking place in the sun's atmosphere, but that additional lines and bands seen when the sun is near the horizon must be due to absorption by the earth's atmosphere. The amount of absorption was assumed to be about 25 per cent when the sun is in the zenith, until Langley and Abbot showed that it must be 40 or 50 per cent of all the energy originally present in the sunbeam. The absorption is greater among the short waves than among the long waves, although there are specific wave lengths in all parts of the spectrum that are almost wholly

absorbed, and others that are very little affected. By virtue of this absorption the air retains a considerable body of heat, which it can lose only by the slow process of radiation; it therefore acts as a moderator of our extremes of temperature both by day and by night, both in summer and in winter. Without the atmosphere and especially without its moisture and its carbonic-acid gas, we should be subject to much greater vicissitudes of cold and heat than we are at present.

**Bibliography.** With reference to the chemical constitution of the atmosphere, general summaries of our knowledge will be found in Schmid, *Lehrbuch der Meteorologie* (Jena, 1861); Hann, *Lehrbuch der Meteorologie* (Leipzig, 1913); Ebermayer, *Die Beschaffenheit der Waldluft* (Munich, 1885); Spring and Roland, *Recherches sur l'acide carbonique de l'air* (Brussels, 1886); Letts and Blake, "On the Carbonic-Acid Gas in the Atmosphere," *Memoirs of the Royal Society of Dublin, 1899.* With reference to the absorption and radiation of heat by the atmosphere, consult Langley, "Researches on Solar Heat: A Report of the Expedition to Mount Whitney," in *Professional Papers United States Signal Service*, No. 15 (Washington, 1884); Langley and Abbot, *Annals of the Astro-Physical Observatory*, vols. i–iii (Washington, 1901–13); Flammarion, *L'Atmosphère* (Paris, 1905); Hann, *Lehrbuch der Meteorologie*, 3te Aufl. (Leipzig, 1913).

**ATMOSPHERIC ELECTRICITY.** Observation shows that the lower atmosphere, with its clouds and rain, or snow and dust, is generally in an electrified state. In November, 1749, Benjamin Franklin argued that lightning is but an immense electric flash, similar to the sparks obtained from electrical machines. On May 10, 1752, Buffon and d'Alibard experimentally confirmed this hypothesis by the use of a lightning-rod near Paris; and in June Franklin himself, by means of a kite raised during a thunderstorm at Philadelphia, was able to draw electric sparks from the clouds and the atmosphere. Since that day an immense number of observations have been made upon the various electric phenomena of the air. Regular observations of atmospheric electricity were originally made either by means of kites carrying insulated wire from the ground up toward the clouds, or more conveniently by means of metal rods insulated from the ground by resin or glass or silk; the upper end of the rod was sometimes pointed, but more properly ended in a sphere; the lower end was connected with a pair of gold-leaf strips, as in the earliest form of electroscope. This apparatus was improved by attaching a slow-burning match or flame at the upper end of the rod. The best of the early forms of apparatus was that of Dellman, in which a brass ball is electrified by induction and afterward its exact condition is determined by applying an electrometer. The modern method devised by Sir William Thomson (Lord Kelvin), about 1860, consists of a reservoir of water, supported on insulating glass pedestals; a small insulated tube leads from the reservoir to some point in the open air, at a distance from the building, and the water flowing through this tube forms a stream that is broken into drops within a few inches of the end of the tube. This constitutes the water-dropping collector. In freezing weather the water must be replaced by a vessel of oil, with wick and flame. The most modern apparatus was suggested by Paulsen. A metal plate has one face coated, electrolytically, with some radio-active substance, preferably ionium. This plate is exposed with its radio-active face down, beneath a metal funnel. Such radio collectors become charged more slowly than good flame and water collectors, and they do not work as well as the latter in light winds. In the water-dropping collector, if the electric potential of the tube and the water at the point where the stream breaks into drops differs from that of the adjacent air, the drops will carry away the positive or negative excess, and soon bring the collector to the same potential as that of the air. The electric condition is observed by measuring, not sparks or currents, but the difference of potential that tends to cause such currents. For brevity, the word "potential" is used to signify difference of potential. The difference of potential between the air and the earth is measured by connecting the ground and the collector to the opposite poles of some form of electrometer, and for this purpose the quadrant electrometer of Kelvin has been most widely used, since it was first introduced at the Kew Observatory in 1861. A modification of all this apparatus has been used in France since 1875, known as Mascart's system, and this apparatus has also been used by the United States Weather Bureau. In 1884 that bureau inaugurated a systematic investigation of this subject by starting observations and studies under the guidance of Professors Rowland at Johns Hopkins and Trowbridge at Harvard University. This work was subsequently placed under the control of Prof. T. C. Mendenhall, whose report was published in the *Memoirs of the National Academy of Sciences*, vol. v (1889). The specific object of this investigation was to determine whether there was any apparent connection between the electrical condition of the atmosphere and the development and progress of storms, so that such observations could be utilized in the improvement of storm and weather predictions, or in drawing lines of equal electric potential on the Daily Weather Map. It was, however, demonstrated that the potential depends so much upon local conditions that observations made in the same neighborhood gave entirely different results, and that it was necessary to learn how to interpret the local record and its oscillations before combining it with records from another station. As it did not seem likely that results of any value in weather forecasting could be secured at present, the further prosecution of the subject was discontinued. The principal work that has been done since 1887 has been that of Elster and Geitel in Germany, Mascart and Chauveau in France, and J. J. Thomson and C. T. R. Wilson in England.

As regards the general phenomena of atmospheric electricity, observations throughout the globe harmonize in showing that, in general, in calm, clear weather a difference of potential exists such that the air is positive and the earth negative; this difference is larger during east and northeast winds in the northern hemisphere, and it oscillates violently during thunderstorms; there are also two daily maxima and two minima; the potential difference is much larger in winter than in summer, except during thunderstorms; the difference increases greatly during falling snow and during strong winds. Lord Kelvin suggests that there may be cloudless masses of air having different charges of electricity floating above and producing the ob-

served changes in potential as they pass by the observer.

As regards the origin of atmospheric electricity, a great number of hypotheses have been advanced and discussed; most of the older ones have been shown to be unsatisfactory, but the newest suggestions are still undergoing discussion, and our knowledge of the whole subject remains in an elementary condition. Perhaps the nearest approach to a plausible explanation is found in the work of J. J. Thomson and C. T. R. Wilson, who have been able to show that when aqueous vapor begins to condense from the air it settles by preference on the particles of dust that have a negative electrical charge, and that a considerable degree of supersaturation is required to make it condense upon those that are positively electrified. It follows that the first formed particles of fog or cloud are negative and are larger and, therefore, heavier; and that they, settling to the earth as rain, give the ground and the lower portion of the atmosphere a negative charge relative to the upper strata of air. This explanation is, perhaps, better than another which has had many adherents, viz., that the earth, being negatively electrified, induces a positive charge in the air. The action of ultra-violet radiations in discharging a negatively electrified body is the same as though they themselves were positively electrified; and this has led to the hypothesis that the radiation from the sun may give a positive charge to the upper layers of the atmosphere. The hypotheses that atmospheric electricity is due to the evaporation of water at the earth's surface, or to the friction of the wind, or to thermo-electric currents, or to the discharge of great volumes of steam through volcanic vents and geysers, must all be given up as insufficient. If it should be found that we must return to the original theory of Peltier that the earth has a negative charge, and that the atmosphere becomes positive by induction, then the most plausible suggestion—but as yet undemonstrated—is that of Clerk Maxwell, viz., that the tidal strains within the earth's crust and the slipping that cause faults and earthquakes give rise to a development of piezo-electricity that has gradually accumulated until the present condition has been attained. This hypothesis connects terrestrial electricity and terrestrial magnetism, and may be considered as a new example of the transformation of energy, since it is equivalent to the daily conversion of a small fraction of the force of gravitation into electricity. Elster and Geitel and Ebert prefer to explain the negative earth-charge by the fact that the solids of the earth's crust select out the negative charges from the highly conductive subterranean and soil air, passing over them as the earth breathes it out. This air is always more or less heavily charged by reason of the radio-active substances now known to abound in the earth's crust. As a result of the absorption the ground-air emerges with a preponderance of positive charges which keep the atmosphere positively charged toward the earth.

For a general summary of our knowledge of atmospheric electricity at the present time, consult Hann, *Lehrbuch der Meteorologie*, 2te Aufl., pp. 546–547 (Leipzig, 1906); H. Mache and E. von Schweidler, *Die atmosphärische Elektrizität* (Braunschweig, 1909); A. Gockel, *Die Luftelektrizität* (Leipzig, 1908). For special memoirs, see Mendenhall, "Report on Atmospheric Electricity," *Memoirs of the National Academy* (Washington, 1889); J. J. Thomson and C. T. R. Wilson, numerous articles in the *London, Edinburgh, and Dublin Philosophical Magazine*, and in the *Proceedings* of the Royal Society of London; Elster and Geitel, numerous memoirs in the *Sitzungsberichte* of the Vienna Academy of Sciences; Elster, a general report published in *Terrestrial Magnetism* (Baltimore, 1900); Gerdiess, articles in the *Physikalische Zeitschrift;* G. C. Simpson, "Atmospheric Electricity in High Latitudes," in the *Philosophical Transactions of the Royal Society* (London, 1905).

**ATMOSPHERIC EN'GINE.** See CALORIC ENGINE.

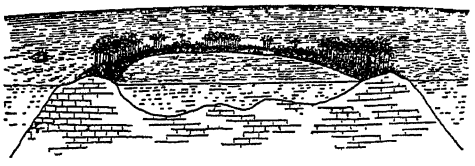
**ATMOSPHERIC IN'FLUENCE.** Air consists normally of oxygen, nitrogen, water vapor, and carbon dioxide; but owing to the continual decomposition of organic bodies that is taking place in nature, its constituents usually include many other gases, as hydrogen disulphide, sulphur trioxide, etc., which may act chemically on various bodies and thus gradually cause their destruction. The destructive effects of atmospheric electricity and changes of temperature may also be included among the influences that tend to destroy various materials.

Atmospheric influence is conspicuously shown on buildings and other structures that are exposed to the air. The atmosphere of large towns usually contains an excess of carbon-dioxide gas, and, where coal is burned, of sulphur. The resistance of many building materials to atmospheric influence is, however, very great. Granite is regarded as the most stable of building stones. Egyptian porphyry is also remarkably enduring. Basalt disintegrates unequally according to the amount of feldspar that it contains. The durability of slate is in proportion to its density. Sandstone, millstone grit, and conglomerates are affected through the decomposition of the material cementing their particles, or the mechanical effect of moisture, as by freezing. Limestone decays with varying degrees of rapidity. The application of melted paraffin to structures that tend to disintegrate has been found of value in protecting them from decay. A notable example of atmospheric influence is presented by the Egyptian obelisk in Central Park, New York, which had withstood the ravages of centuries in a dry atmosphere, but is rapidly disintegrating in the moist climate of New York. The power of brick, tile, and the like to resist the influence of the atmosphere is dependent on the chemical composition of the material and the amount of burning in their manufacture. If they contain lime, they tend to crack and crumble under moisture. Much care is usually exercised in the proper selection of materials in making cements, and those best adapted to resist atmospheric influence are naturally selected. Wood and timbers are easily influenced, and, when moist and exposed to currents, resulting in rapid evaporation, cracks ensue from shrinkage. The decay of wood is due to the action of micro-organisms which secrete the enzyme cytase. For the protection of wood, ordinary oil paint is the usual preservative. Treatment with special preparations, such as kyanizing, creosoting, and pickling in mineral salts, is also not infrequently resorted to. (See WOOD PRESERVING.) In the case of metals the influence is somewhat complicated by chemical and physical changes. Iron, when exposed to the influence of the atmosphere, absorbs oxygen from the air and becomes rusty or coated with iron

oxide. For its protection, as in the case of bridges, a suitable paint is the most satisfactory preservative. Zinc, when exposed, similarly becomes coated with oxide of zinc, which serves to prevent further oxidation. Copper likewise is soon coated with an oxide that serves as a protecting agent. Glass, which is deficient in silica, deteriorates in consequence of the decomposition of its potassium and sodium silicates. Paintings, statuary, and other works of art, as well as books and manuscripts, readily decay under the influence of the atmosphere. The bindings of books in libraries occasionally disintegrate in consequence of the sulphur that is often contained in illuminating gas.

**ATMOSPHERIC RAIL'WAY.** See PNEUMATIC DISPATCH.

**ATOLL,** ă-tŏl'. The name given by the Malays to a coral reef which forms an annular island, inclosing a lake of water. Some atolls are nearly 100 miles in circumference, and have from 15 to 60 fathoms of water. They make excellent harbors, with safe entrances, always on the windward side. Some of the reefs sustain considerable vegetation and are inhabited. See CORAL ISLAND AND CORAL REEF.



CROSS-SECTION AND BIRD'S-EYE VIEW OF AN ATOLL.

**AT'OM.** See DIVISIBILITY; CHEMISTRY; MOLECULES — MOLECULAR WEIGHTS; ATOMIC WEIGHTS; MATTER.

**ATOM, THE HISTORY AND ADVENTURES OF AN.** A romance by Smollett (1769), satirizing the English political parties of the day.

**ATOM'IC THE'ORY.** See CHEMISTRY.

**ATOMIC WEIGHTS.** If one should weigh out a number of volatile oxygen compounds in such quantities that the volumes occupied by them (under some given pressure and temperature) should be equal to one another as well as to the volume occupied by 2 parts by weight of hydrogen gas, he would find, by analysis, that some of these compounds contain 16 parts of oxygen, others 32 parts of this element, still others 48 parts of it, etc. The number of parts of oxygen in any one of the compounds would be either 16 or some multiple of this number; but in no case less. A similar comparison of the compounds of chlorine would show that they contain either 35.5 parts of this element, or some multiple of 35.5, but in no case less. By extending investigations of this kind to volatile compounds in general, chemists have been able to demonstrate that for every element there is a characteristic number representing the smallest amount of that element capable of existing in a certain fixed quantity of a chemical compound, viz., in a quantity occupying, in the state of vapor, the same volume as 2 parts by weight of hydrogen gas under the same conditions of temperature and pressure. This characteristic number is called the *atomic weight* of the element, and is generally implied in its chemical symbol; thus the symbol Cl stands for 35.5 parts of chlorine, and the symbol O for 16 parts of oxygen. The formula $ClO_2$, representing an explosive compound of chlorine and oxygen, shows therefore that that compound contains once 35.5 parts of chlorine and twice 16 parts of oxygen; or, briefly, one "atom" of chlorine and two "atoms" of oxygen. The great advantage of using atomic weights as units of measurement for the several elements consists mainly in the fact that it permits of representing by integral numbers (usually small ones) the composition of any chemical compound, and that it therefore greatly simplifies inquiry concerning the similarities and dissimilarities in the chemical nature of material substances.

In analyzing equal volumes of compounds, it was seen above that the amounts of the elements found would represent either their atomic weights or multiples of these. Water would yield $2 \times 1$ parts of hydrogen and 16 parts of oxygen; hydrochloric acid, 1 part of hydrogen and 35.5 parts of chlorine; caustic soda, 23 parts of the metal sodium (Na), 16 parts of oxygen, and 1 part of hydrogen; common salt, 23 parts of the metal sodium and 35.5 parts of chlorine, etc. If, in studying these compounds, we analyzed, not equal volumes, but equal weights,—say, 100 parts by weight of each—we should find their composition in the form of percentages as follows: Water, 11.11 per cent of hydrogen and 88.89 per cent of oxygen; hydrochloric acid, 2.74 per cent of hydrogen and 97.26 per cent of chlorine; caustic soda, 57.5 per cent of sodium, 40 per cent of oxygen, and 2.5 per cent of hydrogen; common salt, 39.32 per cent of sodium and 60.68 per cent of chlorine, etc. Of course, to say that water contains 11.11 per cent of hydrogen and 88.89 per cent of oxygen is the same as to say that it contains 2 parts of hydrogen and 16 parts of oxygen. But by comparing the two sets of results just cited it is easy to see that, while the percentage figures have apparently nothing in common with one another, those derived from comparing equal volumes indicate plainly the simple laws according to which the chemical elements are distributed in their compounds.

The reason for choosing the volume occupied by two parts of hydrogen gas as the standard volume for the investigation of compounds is simply this, that by doing so no compound will be found to contain less than 1 part by weight of hydrogen; so that the atomic weight of hydrogen will be 1. If, instead of two, one part of hydrogen gas were chosen as the standard, the atomic weight of hydrogen in its compounds would be found to be one-half, the atomic weight of oxygen would be 8, that of chlorine 17.75, etc. The relative magnitude of the atomic weights would, of course, be the same, but the atomic weight of hydrogen would be one-half. Now, the atomic weight of hydrogen being less than that of any other element, chemists prefer to assign to it the value 1, thus making it the unit with which the atomic weights of the other elements are compared. That by doing so they do not render their results any less general may be readily seen from the fact that the "two parts by weight of hydrogen gas" taken may be 2 grains, 2 grams, 2 pounds, 2 anything.

But why should equal volumes of compounds form their comparable quantities? A plausible answer to this question is furnished by Avogadro's hypothesis, according to which equal volumes of all gases and vapors contain, under the

same conditions of temperature and pressure, equal numbers of molecules. Comparing the composition of equal volumes is consequently tantamount to comparing the composition of single molecules; and that a comparison of molecules should be expected to bring out the laws of chemical composition is clear. The smallest weights of the elements found in equal volumes of compounds represent, evidently, the relative weights of single atoms of the several elements, and this is why those weights are termed "atomic weights." It was the application of Avogadro's hypothesis that first led chemists to compare equal volumes of compounds. The first to demonstrate clearly the advantage of doing so was the French chemist Gerhardt, from whom the modern system of denoting the composition of substances is sometimes called Gerhardt's Notation.

In the above discussion, showing that Avogadro's rule is at the basis of the definition and determination of atomic weights, it was tacitly assumed, for simplicity's sake, that the rule is an equally reliable guide no matter what the equal temperatures and pressures, and no matter what the gas or vapor be. In reality the result of applying the rule to a given gas or vapor under a given set of physical conditions can be of no greater precision than the simple gas laws as applied to that substance under those conditions. From this it might be concluded that Avogadro's rule can only approximately indicate the magnitude of atomic weights, and that their precise values can only be obtained by purely chemical methods. In recent years, however, it has been shown that if the deviations from the simple gas laws are properly taken into account, Avogadro's rule leads to atomic weight values of no less precision than those obtained by the best chemical methods.

The rule directing us to compare equal volumes of compounds in the gaseous state, and thus leading to a knowledge of atomic weights, has been extended also to the state of bodies when dissolved in some solvent. (See MOLECULES—MOLECULAR WEIGHTS.) In case, however, compounds can be neither vaporized without decomposition nor dissolved in any suitable solvent, Avogadro's rule cannot be applied, and then some other principle has to be employed, if in the absence of better material the refractory compound must be used for determining the atomic weight of one of its elements.

**Isomorphism.** One such principle is based on the general fact that isomorphous compounds, i.e., substances which have about the same crystalline form, usually resemble one another also in their chemical composition. An example may serve to explain how this general fact is made use of for the purpose of determining atomic weights. Suppose the oxide known as alumina were the only compound available for determining the atomic weight of its metal, aluminum. Alumina is neither volatile nor soluble, and hence its molecular weight could not be determined by Avogadro's rule. But it is isomorphous with the oxide of iron, which is known to contain 2 atomic weights of iron to 3 atomic weights of oxygen. Alumina is therefore supposed to have a similar composition, i.e., to be made up of 2 atomic weights of aluminum and 3 atomic weights of oxygen. A chemical analysis would show that alumina contains 53.03 per cent of aluminum and 46.97 per cent of oxygen. Calling the atomic weight of aluminum Al, and remembering that the atomic weight of oxygen is 16, we therefore have:

$$2\,\mathrm{Al} : 3 \times 16 = 53.03 : 46.97.$$

This atomic weight is consequently found to be

$$\mathrm{Al} = \frac{3 \times 16 \times 53.03}{2 \times 46.97} = 27.1-.$$

**The Discovery of Dulong and Petit.** Dulong and Petit discovered a remarkable fact, which may be stated as follows: When the atomic weight of a solid element is multiplied by its specific heat (i.e., the amount of heat required to raise the temperature one degree), a number is obtained which is nearly the same whichever element is considered. Thus the atomic weight of iron being about 56, and its specific heat 0.1138, the product is about 6.37; again, the atomic weight of zinc being about 65.2, and its specific heat 0.0956, the product is about 6.24. The two products, while not absolutely the same, are nearly equal. Why the products of such different numbers should be about the same is not yet clearly understood. But the fact can nevertheless be used for practical purposes. The mean value of the products corresponding to the several elements is about 6.3. If, therefore, a new element were discovered, and it would be desirable to ascertain roughly its atomic weight, all a chemist would have to do would be to determine its specific heat and divide 6.3 by that quantity. This method of determining atomic weights is especially useful in cases in which there is doubt as to whether the number assigned to an element is its true atomic weight or a multiple of it. The fact discovered by Dulong and Petit can thus be used at least as a check on the atomic weights determined by other methods.

**The Periodic Law.** The celebrated Russian chemist Mendeléeff demonstrated a remarkable relation between the physical and chemical properties of the elements and their atomic weights. For an account of this relation see PERIODIC LAW. Suffice it to say here that the existence of this relation has definitely proved that the atomic weights at present used by chemists are in the truest sense of the term characteristic of the several elements known, and that it is hardly imaginable that future discovery should show them to be worthless and bring about their abolition. Once established, the Periodic Law has been employed as a check on the accepted atomic weights of the elements, but in a sense somewhat different from the law of Dulong and Petit. In several cases (e.g., in the case of platinum), accepted atomic weights were found to disagree with the general relation established by Mendeléeff. The periodic relation thus indicated that those atomic weights must be somewhat incorrect; and, as a matter of fact, careful re-determination showed them to be so and brought to light their true values.

**Atomic Weights referred either to Hydrogen or to Oxygen.** Being purely relative quantities, the atomic weights of the elements assume definite values only if referred to some fixed number chosen to represent one of them. Different sets of atomic weights may therefore be obtained by choosing different standards, and one such set is obtained by assigning to the atomic weight of hydrogen the value 1. This standard seemed at one time preferable to any

other, in the light of Prout's hypothesis, according to which the several chemical elements are not really different from one another in substance, but are condensation products of hydrogen. It was consequently expected that careful atomic weight determination would yield integral numbers, if the atomic weight of hydrogen were taken as the unit. Experiment of the highest precision has, however, shown conclusively that while a really remarkable proportion of atomic weights are integral numbers, many of the exactly known atomic weights cannot possibly be represented by commensurable numbers; so that the common derivation of *all* the elements from one of them is extremely improbable, and choosing a "common unit of measurement" for the atomic weights is useless. Nevertheless the choice of a standard need not be altogether arbitrary. The actual determination of atomic weights involves analytical processes in which many of the elements are weighed as oxides, the required atomic weights being calculated from the weights of these and from the atomic weight of the oxygen contained in them. If hydrogen is taken as the standard, the figure for the atomic weight of oxygen, being determined by an analysis of water, cannot be absolutely exact. That error must then enter into all atomic weights calculated from that of oxygen; and every new determination of the atomic weight of oxygen must necessitate a recalculation of all atomic weights based on that of oxygen. To-day chemists obviate this by taking the atomic weight of oxygen itself as the standard. The atomic weights given in the accompanying table are those recommended in 1913 by an international committee representing the chemical societies of the world. Among the names connected with precise determinations of atomic weights, that of Stas is foremost. In recent years Prof. Theodore W. Richards, of Harvard, has carried out a number of determinations of great precision. See also CHEMISTRY; AVOGADRO'S RULE; MOLECULES—MOLECULAR WEIGHTS; PERIODIC LAW. Consult Richards, *Experimentelle Untersuchungen uber Atomgewichte* (Hamburg and Leipzig, 1909).

| Element | Symbol | Atomic weight |
|---|---|---|
| Aluminium | Al | 27 1 |
| Antimony | Sb | 120 2 |
| Argon | A | 39.88 |
| Arsenic | As | 74 96 |
| Barium | Ba | 137 37 |
| Bismuth | Bi | 208.0 |
| Boron | B | 11 0 |
| Bromine | Br | 79 92 |
| Cadmium | Cd | 112 40 |
| Caesium | Cs | 132 81 |
| Calcium | Ca | 40.07 |
| Carbon | C | 12 00 |
| Cerium | Ce | 140 25 |
| Chlorine | Cl | 35.46 |
| Chromium | Cr | 52.0 |
| Cobalt | Co | 58 97 |
| Columbium | Cb | 93 5 |
| Copper | Cu | 63.57 |
| Dysprosium | Dy | 162 5 |
| Erbium | Er | 167.7 |
| Europium | Eu | 152.0 |
| Fluorine | F | 19 0 |
| Gadolinium | Gd | 157.3 |
| Gallium | Ga | 69 9 |
| Germanium | Ge | 72 5 |
| Glucinum | Gl | 9 1 |
| Gold | Au | 197.2 |
| Helium | He | 3 99 |
| Hydrogen | H | 1.008 |
| Indium | In | 114 8 |
| Iodine | I | 126.92 |
| Iridium | Ir | 193 1 |
| Iron | Fe | 55.84 |
| Krypton | Kr | 82 92 |
| Lanthanum | La | 139.0 |
| Lead | Pb | 207.10 |
| Lithium | Li | 6.94 |
| Lutecium | Lu | 174.0 |
| Magnesium | Mg | 24.32 |
| Manganese | Mn | 54.93 |
| Mercury | Hg | 200.6 |
| Molybdenum | Mo | 96.0 |
| Neodymium | Nd | 144.3 |
| Neon | Ne | 20.2 |
| Nickel | Ni | 58.68 |
| Niton (radium emanation) | Nt | 222 4 |
| Nitrogen | N | 14.01 |
| Osmium | Os | 190 9 |
| Oxygen | O | 16.00 |
| Palladium | Pd | 106.7 |
| Phosphorus | P | 31.04 |
| Platinum | Pt | 195.2 |
| Potassium | K | 39.10 |
| Praseodymium | Pr | 140.6 |
| Radium | Ra | 226.4 |
| Rhodium | Rh | 102.9 |
| Rubidium | Rb | 85.45 |
| Ruthenium | Ru | 101.7 |
| Samarium | Sa | 150.4 |
| Scandium | Sc | 44.1 |
| Selenium | Se | 79.2 |
| Silicon | Si | 28.3 |
| Silver | Ag | 107.88 |
| Sodium | Na | 23.00 |
| Strontium | Sr | 87.63 |
| Sulphur | S | 32.07 |
| Tantalum | Ta | 181.5 |
| Tellerium | Te | 127.5 |
| Terbium | Tb | 159.2 |
| Thallium | Tl | 204.0 |
| Thorium | Th | 232.4 |
| Thulium | Tm | 168.5 |
| Tin | Sn | 119.0 |
| Titanium | Ti | 48.1 |
| Tungsten | W | 184.0 |
| Uranium | U | 238.5 |
| Vanadium | V | 51.0 |
| Xenon | Xe | 130.2 |
| Ytterbium (Neoytterbium) | Yb | 172.0 |
| Yttrium | Yt | 89.0 |
| Zinc | Zn | 65.37 |
| Zirconium | Zr | 90.6 |

**AT'OMICITY.** See VALENCY.

**AT'OMISM** (Gk. *ἄτομος, atomos*, uncut, indivisible, from *ἀ, a*, priv. + *τέμνειν, temnein*, to cut). The term used in philosophy to designate the theory that the universe is not an organic whole—i.e., a whole constituted of parts each of which is what it is only in virtue of its essential relation to other parts. Atomism maintains that the universe is an aggregate of elements (atoms), each of which has an intrinsic nature, and that this intrinsic nature would remain unchanged even if there were no universe, but merely this single element existing in absolute solitariness. Atomism is often materialistic (see MATERIALISM); but spiritualistic or psychic atomism has also been stoutly maintained (see HUME), and a dualistic atomism is equally possible, and is the ordinary commonsense view, according to which the material universe is composed of irreducible and essentially independent units, while the world of mind is regarded as composed of self-subsistent souls standing only in accidental relations. These souls may further be regarded as composed of perceptions, emotions, etc., co-existent and successive. Recently there has been a significant revival of a kind of atomism in William James's philosophy of "radical empiricism"; James regards the universe as composed of elements which he calls "pure experiences," each "pure experience" being a "comminuted absolute." This view is distinguished from earlier atomisms by its emphatic recognition of relations as being fully as real and as ultimate as qualities. See JAMES, WILLIAM; EMPIRICISM.

Some neo-realists (see REALISM) are also atomistic in their philosophy. For adverse criticism of Hume's atomism, consult Green, *Introduction to Hume*, in Green and Grote's edition of Hume's philosophical works (London, 1874), or in Green, *Works* (London, 1885–86).

**ATOMISTS.** See DEMOCRITUS; LEUCIPPUS; EPICURUS.

**ATONEMENT** (from *atone*, literally, to be *at one*). The word is used of reconciliation with God, as expressed in the Bible and Christian thought. The underlying conceptions are common to most religions, but no other religion has formulated them into a theory as Christianity. The theory rests on the idea of a connection between an individual man, or a tribe, and a personal deity; of a rupture between man and his God; of the attempt to heal the rupture. The word can only be properly used of a personal deity. The attempt to conform to a law or ideal of life, as in Buddhism and Confucianism, is not atonement in its historic meaning, for there is no broken personal relation to be made right. Any religion which conceives of a personal God, and of that God as displeased with his people, furnishes the ground for some kind of an atonement. This includes most forms of savage religion; the popular forms of Hinduism, with their personal gods, Vishnu, Siva, and others; the Semitic religions; Mohammedanism and Christianity. The universal assumption of primitive religion is that a god is friendly to his worshipers; but soon evils and disasters lead to the thought that the god is sometimes angry and must be propitiated. The attempt is made to win back his favor by gifts, as would be the case with an angry chief. This, though probably not the origin of sacrifice (q.v.), is one of its early uses. It is natural that gifts of great value should be offered. The need of reconciliation led to valuable gifts in two ways: (1) as demanding costly gifts from the worshipers; (2) as demanding gifts valued by the deity. In this way human sacrifices arose, and also fasting, tortures, and mutilations of the worshiper. The Hebrew ritual provided for no atonement for deliberate crimes, only for unwitting offenses, ritual delinquencies, and business dishonesty. The prophetic conception was that God was not reconciled to man by offerings, but by penitence and a righteous life. The New Testament presents no detailed theory of atonement. Paul emphasized the death of Christ as an element of the reconciliation, and the author of Hebrews thought of reconciliation in terms of the sacrifices of the Hebrew ritual, while Jesus himself spoke of giving his life for the world; but the emphasis of his teaching was on the prophetic idea of repentance as the door of approach to God. In the early Church the problem of the relation of Christ's suffering to the reconciliation of man and God received little attention. The person of Christ, rather than the doctrine of the atonement, was the first great question in the history of Christian thought. That Christ paid a ransom for man was a common thought, but to whom, and how it resulted in the salvation of man, were questions answered either crudely or not at all. Some, including Irenæus, Origen, and Augustine, conceived the ransom as given to the devil. Man, by sin, fell into the power of the devil. God, being just even to the prince of injustice, made a bargain with him by which the devil consented to receive Jesus as a ransom for man: but hell could not keep the Holy One of God, and so the devil lost both Jesus and humanity. This mythological tale of trickery made a strong, if not lofty, appeal and was long used, with increasing dramatic effect, in popular explanations of Christianity. The more refined and philosophical minds could not fail to find it degrading. Athanasius voiced the idea that the ransom was given to God. God was pledged to inflict death for the punishment of sin and could save man only by the incarnation and punishment of his Son in man's stead. How and why this should save man was, however, not satisfactorily explained. There have been three great lines of thought on the atonement in Christian theology: (1) judicial; (2) governmental; (3) moral influence. These group further, in that (1) and (2) are objective, conceiving of the sufferings of Christ as having an objective effect on the attitude of God toward man, and (3) is subjective, conceiving that the effect of the atonement is upon man, not upon God. 1. The first great treatise on the atonement was the *Cur Deus Homo* of Anselm (1033–1109). Man owes God perfect obedience; but man has sinned and so robbed God of the homage due to him. Should any one live a perfect life, that would not repair the injury done to the honor of God by past sins. Man must pay the debt, but man cannot. Since the debt is against the Infinite, only an Infinite Being can discharge it; hence the need of the God-man. Christ yielded perfect obedience, but he also gave his life. Justice did not demand death from a sinless being, and so he deserves a reward. But Christ cannot be rewarded, since all things that are the Father's already belong to him. The salvation of men, his human kindred, is therefore given him as a fitting reward. This theory rests upon legal notions of homage and merit (whether Roman or German is still disputed); upon the ideas that sin is infinite, because against an infinite God, and that the entire redemptive work of Christ lies in his death, not in his life. This general type of judicial theory has persisted to this day, sometimes with modifications, in both Catholic and Protestant theology. Other forms of the judicial, or penal, theory arose. Thomas Aquinas held that Christ's perfect obedience actually made complete compensation for sin. The theory of Aquinas has become the orthodox theology of the Catholic church. The same general theory was held by the Protestant reformers. They emphasize, however, not the violation of God's honor, as did Anselm, but of his justice. Frequently retributive justice was regarded as an eternal law, binding the action of God himself, prohibiting the free exercise of divine mercy, and demanding satisfaction before man could be saved. 2. The governmental theory arose from the work of the great Dutch jurist, Hugo Grotius (1583–1645). He set out to defend the orthodox views from the attacks of Socinus, who, assuming from Anselm that the relation of God and man was that of creditor and debtor, held that no objective atonement was necessary, since the love of God could forgive the debt of sin in a penitent soul. Grotius substituted the relation of ruler and subject for creditor and debtor. Sin is a wrong against public law, and law must be vindicated. A ruler may, however, remit a penalty if the law can be

otherwise vindicated. The death of Christ secures this result by showing impressively what sin deserves. It is not the actual punishment, but rather a symbol of punishment. So the purpose of justice is attained, and the love of God may forgive the penitent sinner. In general the Calvinistic theology rejected, and the Arminian accepted, the governmental theory. It affected New England Calvinistic theology, however, till its later representatives, the younger Edwards, President Dwight, Nathaniel Taylor, and the "New School" Presbyterians held firmly to it. It has been characteristic of the less strictly conservative of the schools of Protestant thought. 3. A third general group of theories is known as the moral-influence theory. Its roots, though not its completed form, go back to Duns Scotus (d.1308) (q.v.). He held that, since the will of God is absolute, he might have accepted deeds of love done by an angel, or by a mere man, as the satisfaction for sin, but God chose the gift of his own Son as the most impressive means of arousing love and so winning man back to himself. In modern times the conception of Christ's life and death as God's appeal to man has been very influential. It has been felt that God needed not to be reconciled to man, but man to God. The most effective presentation of this general theory made in America was in the writings of Horace Bushnell. He published three works on the subject, each of which modifies in some measure the positions of the last. His final work, *Forgiveness and Law* (1874), holds that forgiveness is possible only if one suffers on behalf of the offender; that in Christ God himself has done this on behalf of man. These sufferings are the expression of God. The correlative of expression is impression, and this exhibition of the love of God draws men to him. The moral-influence theory, in varying form, has been expressed by Schleiermacher, Nitsch, Rothe, and Ritschl and his followers in Germany; by Vinet, Bouvier, and Auguste Sabatier in French thought; by F. D. Maurice, John Caird, and Jowett in England; and, besides Bushnell, by William N. Clarke and by George B. Stevens among recent writers in America. All three types of atonement are held in modern thought, as is shown by such a book as *The Atonement in Modern Religious Thought* (New York, 1901), where essays from 17 writers are gathered, representing widely varying opinions, all held within the bounds of orthodoxy. For recent discussions, consult Dale, *The Atonement* (London, 1885); Clarke, *Outline of Christian Theology* (New York, 1897); Sabatier, *The Doctrine of the Atonement and its Historical Evolution* (New York, 1904); Tymms, *The Christian Idea of the Atonement* (New York, 1904); Stevens, *The Christian Doctrine of Salvation* (New York, 1905); Burton, J. M. P. and G. B. Smith, *Biblical Ideas of the Atonement* (Chicago, 1909). See CHRISTIAN SCIENCE.

**ATONEMENT, or EXPIATION, DAY OF.** A Jewish fast day, occurring on the tenth day of the seventh month (Tishri) and observed as a day of humiliation and supplication. The laws in connection with it are found in Lev. xvi., and in some scattered passages (Ex. xxx. 10; Num. xxix. 7–11), all regarded as of comparatively late origin. (See PENTATEUCH.) It was a day devoted to worship, on which all manner of work was forbidden; abstention from food, from drink, and pleasure commanded; and so long as the temple stood, during the post-exilic period, a long sacrificial service was gone through. The centre of the service was the high priest, who had, according to the Talmudical tradition, to spend the seven preceding days in separation from all persons and in careful study of the duty imposed upon him. On the day of Atonement, dressed in white linen garments (not in the gorgeous dress of his office), he entered the holy of holies and confessed his sins. He then chose two goats and by lot determined which one was to be sacrificed. This one was killed, and its blood sprinkled in front of the veil in the holy of holies. The second one, after the high priest had rested his hands on its head and had confessed the sins of the whole people, was given in charge of trusty men, who led it outside of the city limits, and then one of them released it in the wilderness (Lev. xvi. 10–21). While the biblical ritual for the day contains some evidently ancient features, and while the sanctity of the tenth day of the "sacred" seventh month probably reverts to an early epoch, the institution of the distinctively Jewish Day of Atonement is regarded by many scholars as an outcome of religious conditions during the Babylonian exile. The earliest trace of the biblical ceremonial outside of the Pentateuch is to be found in Ezek. xlv., though his prescriptions for the day are much simpler than those found in Leviticus. With the destruction of the temple and the abolition of sacrifice, the Day of Atonement was changed in one important particular—from being a purely national fast it came to have also an individual side. At present the day is kept by fasting from sunset of the ninth to sunset of the tenth day of Tishri and by services in the evening and all day. An important part of the service is the recital of the service of the temple, as handed down by tradition.

Just as the popular sense of guilt experienced during the Babylonian exile seems to have furnished the conditions favorable for the institution of a great atonement day, so the second destruction of Jerusalem directly contributed not only toward enhancing the importance of the day, but toward giving to it a sombre character relieved only by the consolatory hope of securing, by a strict obedience to elaborate ceremonial regulations, forgiveness of individual sin and the assuagement of divine anger manifested by the loss of national independence. An entire treatise of the Talmud, known as *Yoma* (i.e., 'The Day par excellence'), is devoted to setting forth the ceremonies and ritual for the fast, and despite general laxity prevailing in wide circles, Jews of the most advanced views still observe the day as the most sacred of the year.

**Bibliography.** On the biblical observances and questions connected with its origin consult: W. Nowack, *Hebräische Archäologie*, vol. ii (Freiburg, 1894); I. Benzinger, *Hebräische Archäologie* (ib., 1894); I. J. Wellhausen, *Prolegomena zur Geschichte Israels* (Berlin, 1899); for the later observances: J. Lightfoot, *The Temple Service*, vol. ii of his Collected Works (London, 1864); A. Edersheim, *The Temple: Its Ministry and Services* (ib., 1894); L. Dembitz, *Jewish Services in Synagogue and Home* (Philadelphia, 1898).

**ATOSSA** (Gk. *Ἄτοσσα*, Per. *Atuša*). The daughter of Cyrus, and the wife successively of her brother Cambyses, Smerdis, and Darius,

son of Hystaspis. She is mentioned by Herodotus, and according to one account was killed by her son Xerxes. The name corresponds merely in form to that of Vīshtāspa's wife, Hutaosa, in the *Avesta*. See ZOROASTER.

**ATOXYL.** Sodium arsanilate. An arsenic compound having the same action as Fowler's solution and said to be many times less poisonous. Koch believed the drug to be a specific for sleeping sickness, and it was for a time much used in that disease as well as in syphilis. It was found, however, to produce atrophy of the optic nerve in some cases and is therefore less frequently employed now than formerly. In syphilis it has been entirely superseded by salvarsan (q.v.).

**ATRATÓ,** ä-trä'tō. A river of western Colombia, South America, flowing into the Gulf of Darien (Map: Colombia, B 2). It is about 400 miles long, occupying a longitudinal valley just west of the Coastal Cordillera, its bed sloping very gently to the north, its sources high on the western slopes of the Cordillera Occidental. It is navigable for 250 miles. Its sources are not far from those of the San Juan River, which empties into the Pacific, and A. von Humboldt suggested that the two rivers might be utilized in making a canal route between the Atlantic and the Pacific. Survey parties were sent out by the United States in 1857 and 1870; but the reports in both cases were unfavorable, and the canal project was abandoned.

**ATREBATES,** ā-trē-bā'tēz *or* ăt'rē-bā'tēz, or ATREBATII, ăt'rē-bā'shĭ-ī (Lat.). A people of Belgic Gaul, whose name survives in the name of the old province of Artois. In a confederation against Julius Cæsar they furnished 15,000 troops. There was once a colony of them in Britain, in Berkshire and Wiltshire.

**ATREK,** ä-trĕk'. A river of Persia (Map: Persia, F 2). It rises in the northeastern part of the country, near Kuh Rizeh Mountain (9700 feet), and, flowing west, forms part of the boundary between Russian Central Asia and Persia. It falls into the Caspian Sea, at Hassan-kuli Bay, after a course of over 300 miles.

**ATREUS,** ā'trōōs (Gk. Ἀτρεύς). In Greek legend, son of Pelops and Hippodamia, grandson of Tantalus, and brother of Thyestes. In the *Iliad* there is no trace of the terrible feud between the brothers. This legend develops later, perhaps under the influence of Dorian hostility to the Achæan rulers of the Peloponnesus, and is told in many forms. The main features are as follows: Atreus married Cleola, by whom he was the father of Pleisthenes; his next wife was Aërope, by whom he had Agamemnon and Menelaus; his last wife was Pelopia, daughter of his brother Thyestes. The main story of Atreus begins in blood, he and Thyestes being induced by their mother to kill their step-brother Chrysippus, the son of Pelops and the nymph Axioche. After the murder the perpetrators fled to Mycenæ, where the King, Eurystheus, was their nephew. Eurystheus lost his life in war with the Heraclidæ, and Atreus succeeded him as King of Mycenæ. Thyestes seduced Atreus's wife Aërope and stole the golden lamb which was the gift of Hermes. Atreus expelled Thyestes, who sent Atreus's own son Pleisthenes to kill him (Thyestes had brought Pleisthenes up as his own son); but the father slew the son without recognizing him. Then Atreus prepared a great revenge. Professing to be reconciled to Thyestes, he invited him to Mycenæ, killed the sons of Thyestes, and served them as a banquet for their father. In the midst of the meal Atreus showed the heads and hands to Thyestes, who, struck with horror, cursed the house of Atreus and fled, while the sun turned its face from the scene. Thyestes went to Sicyon, and there found his daughter Pelopia, whom he violated without recognizing her. She was then married to Atreus, who was also ignorant of her parentage. Her child by Thyestes was exposed, but rescued and brought up by Atreus, who named him Ægisthus. Later Atreus sent Agamemnon and Menelaus in search of Thyestes, whom they brought back to Mycenæ; whereupon Atreus imprisoned him and sent Ægisthus to kill him. Ægisthus having been recognized by his real father, Pelopia became aware of the dreadful truth and killed herself, while Ægisthus slew Atreus, who was offering sacrifice on the seashore. In later times the great domed tombs at Mycenæ were pointed out as the treasuries of Atreus and his sons; the largest is still popularly called the "Treasury of Atreus." See ATREUS, TREASURY OF.

**ATREUS, TREASURY OF.** A famous subterranean structure at Mycenæ, so called on the authority of Pausanias. It is also popularly called the "Tomb of Agamemnon." It is the largest of the vaulted tombs called "bee-hive" tombs from the method of vaulting in which the arch is formed by projecting horizontal layers of stones narrowing to the top. The building consists of a circular chamber, 50 feet wide and high, connected with a small square room, both covered by the material removed in the process of building. It is approached by an entrance passage of masonry 115 feet long, leading to a deep doorway richly ornamented.

**ATRI,** ä'trē (anciently, *Hadria*). An episcopal city in the province of Teramo, Italy, 8 miles from the Adriatic and from Mutignano, which is on the Bologna-Brindisi Railway, and 79 miles south of Ancona. The cathedral has interesting frescoes, and a fifteenth-century painting of the Madonna adoring the Child. The campanile is over 200 feet high. There are a few ruins of ancient walls and buildings, and south of the city are grottoes probably once used as prisons. Manufactures include silk, soap, and licorice. Pop. (commune), 1881, 19,642; 1901, 13,488; 1911, 14,043.

**ATRIPLEX** (Lat., from Gk. *ἀτράφαξυς, atraphaxys*, the orach). The name of a genus of plants of the family Chenopodiaceæ. The species are numerous and are found in nearly all tropical and temperate climates. Many of them are weeds, but a number have come into notice as valuable forage plants for the hot alkali regions of Australia and California. For this purpose *Atriplex semibaccata* and *Atriplex leptocarpa* are among the most promising. They are commonly known as saltbushes, because they grow in saline regions, where no other valuable plant will survive.

**ATRIUM** (Lat. a hall; literally, dark-room, from *ater*, black, dark, referring to the smoke from the stove or hearthstone. See below). In Roman architecture, the one large apartment of the primitive Italic and Roman house; the general room which served for kitchen, dining room, reception and sleeping room. In it was the hearthstone, and the nuptial couch remained there as a symbol, even after the addition of bedrooms around it. As the Roman house became more sumptuous, small

rooms were multiplied around this central hall, which remained immediately opposite the entrance, and then took the name also of *cavædium*. There were different kinds of atria: (1) the earliest kind, with the solid roof (*atrium testudinatum*); (2) next, the Tuscan atrium (*tuscanicum*), which became the national type before the close of the Republic, with a square opening (*compluvium*) in the centre for admitting light. The roof sloped inward, so that rain water flowed into a basin (*impluvium*) beneath the opening. With the enlargement of house and atrium came (3) the tetrastyle atrium (*tetrastylum*), with four columns supporting the roof around the central opening; and finally, with the further sumptuousness of the times of Cicero and Augustus, came (4) the Corinthian atrium, where the four columns are multiplied into a real colonnade; and in this form the atrium is indistinguishable from a peristyle court, a private cloister. There was another early kind of atrium, used especially for winter apartments, in which the roof slanted upward toward the centre, like our roofs, instead of downward, and shed the water instead of collecting it (*displuviatum*). The patrician and richer equestrian houses of the late Republic and Empire usually had two atria—first, the old-fashioned kind (1; 2), for the transaction of business, and in front of it the shops; and beside and beyond it, the *alæ* and *tablinum;* then a peristyle atrium, with columns, with rooms opening on to it, where the family life was carried on. The later atria were beautifully decorated with frescoes and sculptures, vases and fountains. The best-preserved atria of all kinds are in the houses of Pompeii. The term was also sometimes used of religious or public buildings, in the form of courts, such as the Atrium Vestæ, attached to the house and temple of Vesta, and the Atrium Libertatis, which contained the first library founded in Rome.

In Christian architecture the atrium was a larger columnar or arcaded open court in front of the basilical churches, used for meetings or promenades, and even for *agapæ* and fairs. In the centre stood the fountain for ablutions. In it gathered the penitents who were not allowed in the church. These *atria* went out of use in the early Middle Ages. Those at Parenzo (sixth century), Sant' Ambrogio, Milan (ninth century), San Clemente, Rome (eleventh and twelfth centuries), and in the cathedrals of Capua and Salerno are the best preserved. The Mohammedans adopted the atrium with its fountain as an indispensable feature of all their mosques. In the monastic architecture of the early and Middle Ages the cloister was evidently the atrium moved from the front to the side of the church and reserved for the use of the monks. See CLOISTER.

**ATROPATENE**, ăt'rō-pā-tē'nē (Gk. Ἀτροπατήνη). The ancient name of the mountainous Persian province of Azerbaijan, or Adarbaijān, to the west of the Caspian Sea. Its name is said to be due to Atropates, whom Alexander placed over the district in 328 B.C. In Pahlavi the name appears as Ataro-patakan. It belonged to the Kingdom of Armenia from 149 B.C. to 428 A.D. The principal city of the province is Tabriz. The second city, Urumiah, on the lake of the same name, is of great antiquity.

**ATROPHY** (Gk. ἀτροφία, *atrophia*, want of nourishment; from ἀ, *a*, priv. + τροφή, *trophē*, nourishment). A morbid condition of animal or vegetable life, resulting in deficient nutrition and consequent wasting either from disease or disuse. A familiar example is the atrophy of certain groups of muscles in infantile spinal paralysis or cerebral palsies. The term is not applied to the mere withholding of the requisite supply of nutriment, but to the condition produced by various diseases that affect the body. See NUTRITION; DIGESTION, ORGANS OF; DYSPEPSIA; HYPERTROPHY.

**ATROPINE** (derived from *Atropos*), or DATURINE, $C_{17}H_{23}NO_3$. An alkaloid prepared from the deadly nightshade (*Atropa belladonna*). The plant contains the alkaloid *hyoscyamine*, which is readily converted into atropine on addition of potash to the juice. The atropine thus produced is extracted by shaking the alkaline liquid with chloroform. The chloroform layer is removed and evaporated, leaving a residue which is extracted by means of dilute sulphuric acid and subsequently precipitated with potassium carbonate. The precipitated alkaloid is recrystallized from alcohol. Atropine itself is insoluble in water; its sulphate, however, is readily soluble and is commonly used in medicine to produce dilatation of the pupil of the eye, also as an antispasmodic in whooping cough. It is also used as a remedy for seasickness. It acts as a narcotic, and is exceedingly poisonous, half a grain of it being positively fatal. The symptoms of atropine poisoning are: rapid pulse, dry and flushed skin, dryness of the throat, etc. In cases of atropine poisoning, energetic stimulation of the skin and a hypodermic injection of pilocarpine and stimulants are recommended, after using the stomach pump. The principal physiological effect of atropine is reduction of the excitability, and eventually paralysis of the motor nerves, resulting in inability to move. See BELLADONNA; ALKALOIDS.

**AT'ROPOS** (Gk. Ἄτροπος, the unturnable, the undivertible, the inflexible, unbending, from ἀ, *a*, priv. + τρέπειν, *trepein*, to turn). One of the *Moeræ*, or *Parcæ*, the Fates—who severs the thread of man's life. In late art she is represented with a cutting instrument or a pair of scales or a sun-dial. See PARCÆ.

**ATRY'PA** (Gk. holeless, from ἀ, *a*, priv. + τρῦπα, *trypa*, a hole). A name applied by Dalman in 1827 to a group of fossil brachiopods, the shells of which were by him supposed to be without a foramen in beak of the ventral valve. Under the early diagnosis the genus held a large number of species of various internal structure and exterior ornamentation, which ranged throughout all geological formations from the Ordovician to the Cretaceous. More recently the generic term has been restricted to those forms closely allied to the original species, *Atrypa reticularis* of Linnæus, which Dalman used as the type of his genus. The best-known species of the restricted genus is this *Atrypa reticularis*, with its depressed ventral valve and its calcified brachial spires directed toward the centre of the swollen dorsal valve, which species is of interest by reason of its exceedingly long period of existence. It appeared in the earliest Silurian time, and with various modifications, characteristic of particular ages through which it lived, it continued to the end of Devonian time. Its life period is exceeded by that of only one other fossil, *Leptæna rhomboidalis*, and the study of its variations in time and

space is of the greatest interest as affording an excellent example of the manner of evolution of new species; many of its varieties having continued to evolve along distinct lines until they became entirely unlike, in a specific sense, the original form from which they separated. See, for illustration, BRACHIOPODA.

**ATSINA.** See GROS VENTRE.

**ATSUTA,** ät-sōō'tä. A town of Japan in the prefecture of Aichi (Map: Japan, E 6). It is situated in the southern part of Honshiu, 4 miles by rail from Nagoya, of which it is practically a suburb. It contains a number of Shinto temples, erected in the seventh century A.D., and modeled after the famous temples of Ise. In one of them is treasured the famous sword which forms part of the Imperial regalia of Japan. Pop. (latest report), 1898, 24,941.

**ATTACAPAN.** See ATAKAPA.

**ATTACHÉ,** ä'tä'shā' (Fr. attached). A subordinate or assistant attached to the suite or company of a superior officer. In modern usage the term is practically confined to subordinate members of an embassy or legation. Military and naval attachés are officers of these two services accompanying the diplomatic representative of their country, with a special view to observing conditions and movements of interest to the military or naval administration at home.

**ATTACH'MENT** (Fr. *attachement,* from *à,* Lat. *ad,* to + Bret. *tach,* Eng. *tack,* a nail). The legal process under which a sheriff or like officer takes a person or property into custody. Also the proceeding under such a process. An attachment against the person was used most frequently, either to compel the appearance of a defendant in an action, or to secure the attendance of a delinquent witness or juror, or to bring before a court one guilty of contempt. It was, and still is, employed in England as a process for the enforcement of decrees or orders in equity. It was rarely so used in common-law actions, because a judgment creditor who resorted to it forfeited his right to go against the debtor's property. In this country the seizure of the person of a debtor in a civil action is made generally under an order of arrest, or an execution against the person. Attachment of the person for contempt of court is common, however, in this country.

The attachment of property is regulated by statute. It is not accorded to the creditor in an ordinary action for the recovery of a debt. To entitle him to this process he must show, generally, that the debtor is a non-resident of the State in which he asks for the process, or has left it with intent to defraud his creditor, or conceals himself or his property with like intent, or that he has removed, or is about to remove, from the State in order to defraud his creditors. In such cases the property is to be attached and taken into the custody of the law, so that it may be applied to the plaintiff's claim, if that is subsequently reduced to a judgment. An attachment is looked upon by our courts as a harsh and extraordinary remedy, one not known to the common law, and as a rule they are disposed to put a strict construction upon the statutes which authorize it. In admiralty, a vessel or other property against which a suit *in rem* has been instituted may be attached when the circumstances would not warrant an attachment in a State court. An attachment is spoken of as *domestic,* when it is employed against the property of a resident of the State in which it issues; as *foreign,* when the owner of the property seized is a non-resident, who evades the personal service of a summons in the action. Consult Drake, *Treatise on the Law of Suits by Attachment in the United States* (Boston, 1891), and the works referred to under ARREST; EXECUTION; FOREIGN ATTACHMENT.

**ATTACK'** (Fr. *attaque,* the same in derivation as ATTACHMENT). A military operation against an enemy. It may apply to any action which brings one body of troops in battle in contact with another, but is more generally applied to a distinct military operation by which an enemy's position is assailed. Smokeless powder, magazine rifles, machine and rapid-fire guns, improved breech-loading field and horse artillery guns, scientifically trained and more intelligent troops, have practically reduced the method of attack to a science. While there is in every system of tactics a clearly defined outline of "attack formation," its actual order or method will depend altogether on the general character and contour of the ground to be fought over and the military genius of the officer in command. Generally speaking, the attacking infantry force is divided into three bodies—firing line, supports, and reserves. Before the beginning of the actual attack, a reconnaissance is generally made by the cavalry and horse artillery, and the position and strength of the defending forces discovered, together with all other information possible. If the defending forces have been compelled to occupy or have made the mistake of selecting a position which is open to attack on one or both flanks, the attack will be so arranged as to threaten them on the flanks as well as in front, a feint being made to cover the real point of attack, which will be made wherever the defenders develop the greatest weakness. Any commanding eminence will be seized if possible by the attacking force, the heaviest ordnance placed there, and the defenders' position thoroughly shelled. Artillery using "indirect" fire from concealed positions prepares the way for the modern attack, firing over the advancing infantry. Once the infantry is within the artillery zone of fire, or actual contact with the defenders is made, cavalry cease to be much of a direct factor. The necessity frequently arising of reinforcing some distant part of the firing line, however, has, among other causes, brought into existence mounted infantry. (See CAVALRY and MOUNTED INFANTRY.) These troops have the mobility of cavalry, are practically infantry, and can reinforce speedily in circumstances that would be generally impossible to a marching infantry regiment. Mounted infantry, however, is not recognized as a permanent arm of the military service, but is called into being to meet the needs of a particular campaign. Mounted infantry was first employed by General Miles of the United States army. He transformed the fifth infantry into mounted infantry during operations against the Nez Percés Indians.

The extended battle front made necessary by modern arms makes the handling of troops under fire both difficult and dangerous. The firing line is extended, followed by its supports, who are in as close a formation as circumstances will admit, while the reserves are still farther behind. The casualties of the firing line are made up from the supports. In the final charge,

which is made by the firing line, reinforced by the entire supports and whatever of the reserve circumstances have rendered necessary, the defenders' position is rushed with the bayonet. In the event of failure the reserves cover the retreat of the charging line, carrying on the advance if possible, or in any event covering the *point d'appui*. If successful, the reserve force completes the final rout of the defenders, prevents their reorganization, and, assisted by the cavalry (who are harassing the fleeing troops on the flanks and endeavoring to head them off), try to secure their guns, transport, stores, and munitions of war.

The modern attack is the point in which all minor "actions" merge, the successful carrying out of which is frequently the decisive blow of the campaign. The danger and losses incurred in such an undertaking will depend largely on the skill the defenders have shown in their selection of a position, or the extent to which nature has favored them. A recent example is the successful attack on the Spanish lines at Santiago, Cuba, by the American forces under General Shafter, in the Spanish-American War of 1898, an action where the Spaniards had every advantage of position and cover. Examples of good and bad positions may be found in the Anglo-Boer War of 1899–1902. Ladysmith, whose defense was necessary on account of the valuable stores located there, sustained one of the most terrible sieges of modern times. The position (which was forced upon the British General White) was directly under the fire of the Boer artillery, and could have been taken eventually had the Boers been as skillful as they were courageous. The position chosen by the Boers at the battle of Modder River had every possible natural advantage and was very cleverly selected. One of their flanks and their front were protected by a swift-flowing and swollen river, which afforded few if any fording places, while the other flank rested on an impassable range of mountains. Their front also had a practically impregnable character, owing to the steep kopjes. Held by trained troops, the position would have been impregnable, as the British had to advance along an open plain and were exposed to the formidable fire of the Boers. The position was eventually taken, after repeated failures, with terrible losses. The more recent war between the Balkan allies and Turkey presented numerous instances of determined attacks upon fortified places which were defended with fanatical valor. For an account of the influence of modern weapons and tactics upon methods of attack, see narrative of Russo-Japanese War describing Japanese attacks on Port Arthur. See BATTLE; TACTICS, MILITARY.

**ATTACK.** In music, a technical term meaning the spirit and style with which a performer, singer, or musical organization begins a phrase.

**ATTAIN'DER** (OF. *ataindre*, to accuse, convict). At common law, the legal extinction of all civil rights as a consequence of a judgment of outlawry for a capital offense, or of a judgment of death for treason or felony. It did not follow upon conviction, but only upon final judgment, for, says Blackstone, "after conviction only, there is still a possibility of the accused's innocence. Something may be offered in arrest of judgment, or the indictment may be quashed, or he may be pardoned, or allowed the benefit of clergy. But when judgment is once pronounced, both law and fact conspire to prove him completely guilty. Then it is clear beyond all dispute that the criminal is no longer fit to live, but is to be exterminated as a monster and a bane to human society, and the law sets a note of infamy upon him, puts him out of its protection, and takes no further care of him than barely to see him executed. All his civil rights are extinct, for by an anticipation of his punishment, he is already dead in law." The first consequence of attainder, therefore, was the forfeiture of all the victim's property. This forfeiture, in the case of lands, related back to the time when the crime was committed, so as to avoid all intermediate sales and incumbrances. In the case of goods and chattels, attainder had no such retroactive effect. But common-law attainder did not stop with the forfeiture of the condemned criminal's estate. It produced "corruption of blood, both upward and downward, so that the attainted person could neither inherit property from his ancestor" nor retain that of which he was in possession, nor transmit it to an heir, nor be the medium through which descent was legally traceable. These consequences of attainder have been modified in England by statute. The forfeiture or escheat of real estate was limited to cases of attainder for treason or murder by 54 Geo. III, chap. 145; and by 33 and 34 Vict., chap. 23, attainder and corruption of blood were abolished, while forfeiture and escheat were limited to judgment of outlawry.

The Constitution of the United States provides that "The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted" (Art. III, Sec. 3). Similar provisions are embodied in some of the State constitutions. In other States, not only the corruption of blood, but all forfeitures of property consequent upon criminal judgments against the owners, are abolished. The United States Supreme Court has declared that the constitutional provision quoted above was introduced for the benefit of the children and heirs alone. It was a declaration that the children should not bear the iniquity of the fathers. Accordingly, if a traitor's property is confiscated by the United States, no interest is left in him that he can convey by deed, and his heirs take the inheritance at his death. Attainder consequent upon legislative enactments will be considered under BILL OF ATTAINDER. Consult: Blackstone, *Commentaries on the Laws of England;* Stephen, *New Commentaries on the Laws of England* (18th ed., London, 1903); and the authorities referred to under CRIMINAL LAW; FORFEITURE; CONSTITUTIONAL LAW.

**ATTAINDER, BILL OF.** See BILL OF ATTAINDER.

**ATTAINT', WRIT OF** (for derivation, see ATTAINDER). A proceeding in the nature of an appeal from a judgment entered upon the verdict of a jury. Under this writ a jury of 24 was summoned to determine whether or not the first jury had given a false verdict. As jurors were sworn to find the truth, a finding by the second jury. "made up of knights or other more considerable persons than the first," that the latter had rendered a false verdict, operated not only as a reversal of the verdict, but subjected the attainted jury to severe punishment for perjury. After the right of jurors to return a verdict according to their own consciences was

established by Bushel's case in 1670 (6 State Trials, 99), and motions for new trials came into use, this proceeding was seldom resorted to. In 1757 Lord Mansfield said: "The writ of attaint is now a mere sound in every case." It was abolished in 1825 by Act of Parliament (6 Geo. IV, chap. 50, sec. 60) except as to jurors guilty of embracery. Consult Blackstone, *Commentaries on the Laws of England* (Oxford, 1765–68), and Thayer, "Trial by Jury and its Development" in his *Preliminary Treatise on Evidence at the Common Law* (Boston, 1898).

**AT'TALE'A** (named from the gorgeousness of its growth; see ATTALUS III). A genus of palms, comprising about 25 species, natives of the tropical parts of South America. They have in general lofty cylindrical smooth stems, but there are some stemless species. The leaves are large and pinnate. The fruit has a dry fibrous husk, inclosing a nut with three cells and three seeds. The leaves of some species are much used for thatching and are woven into hats, mats, etc. The nuts of *Attalea excelsa* and of *Attalea speciosa* are burned to dry the india-rubber obtained from the *Siphonia elastica*, which acquires its black color from their smoke. The leafstalks of *Attalea funifera*, which is found in the southern maritime provinces of Brazil, and there called Piassaba, yield a fibre much used for cordage. The ropes made of it are very strong, and extremely durable in salt water. The Piassaba palm of the northern parts of Brazil, however, is totally different, and much of the Piassaba fibre imported into Great Britain is obtained from it. The fruit of *Attalea funifera*, known by the name of Coquilla nut, is as large as an ostrich's egg and supplies a kind of vegetable ivory used for making umbrella handles, etc. The fruit of *Attalea compta*, the pindôva or indajá palm, is of the size of a goose's egg, and the kernels are eatable. It is a stately and beautiful tree, with a wide-spreading crown. *Attalea cohune* is a native of Honduras, where the oil of its fruits is used for soap making and is exported for the same purpose.

**AT'TALI'A** (Gk. Ἀτταλία, *Attalia*). A city of ancient Pamphylia, on the south coast of Asia Minor, the modern *Adali* , near what is left of the river Catarrhactes, as it flows into the sea at the head of the Gulf of Adalia. It was founded by Attalus II, King of Pergamum (159–38 B.C.). In Roman times it was an important seaport, being located on the great trade and military route connecting the northwestern districts of Asia Minor with its southern coast. The Apostle Paul sailed from Attalia to Antioch in Syria, on his return from his first missionary journey (Acts xiv. 25). Unlike many of its neighbors, Attalia has maintained its relative importance to the present time.

**AT'TALUS** (Gk. Ἄτταλος, *Attalos*). Uncle of Cleopatra, the wife of Philip II of Macedon, and general under Philip. At Philip's wedding he insulted Alexander, the son of Olympias, and thereby helped bring about a separation between father and son. After the death of Philip he undertook to oppose Alexander, but was finally killed by the latter's order.

**ATTALUS,** FLAVIUS PRISCUS. Prefect of Rome under Honorius, and later for one year (409–10) Emperor of the West. He was the first to be raised to that office solely through barbarian influence, being proclaimed by Alaric and his Gothic army after the second surrender of Rome, when Honorius was deposed. The barbarians set Attalus up at Ravenna, whence he sent a message to Honorius commanding him to leave the throne, retire to a desert island, and cut off his feet. But Alaric soon wearied of him, and he was deposed. After Alaric's death Attalus remained with Ataulphus, as a musician, and in 413 helped to celebrate the nuptials of Ataulphus and Placidia. Ataulphus put Attalus forward again as a rival emperor during the insurrection of Jovinus (414), but he was taken prisoner and brought to Honorius, who inflicted on him a part of the sentence he had written for the Roman Emperor; he cut off his thumb and forefinger and banished him to the island of Lipari.

**ATTALUS I,** called SOTER (269–197 B.C.). King of Pergamum from 241 to 197 B.C. Just before he became king, or in the first year of his reign, he gained a decisive victory over the Galatians, and by 226 B.C. he had made himself master of the whole of Asia Minor west of Mount Taurus. He soon, however, lost most of his conquests. Later he became an ally of Rome against Philip V of Macedon. Attalus was a wise and just ruler and a friend of the arts and sciences.

**ATTALUS II,** surnamed PHILADELPHUS (220–138 B.C.). King of Pergamum. Before coming to the throne he gained distinction as a brave and able military leader and was on several occasions sent as ambassador to Rome. He succeeded his brother Eumenes, 159 B.C. He founded Philadelphia in Lydia, and Attalia in Pamphylia, and was a generous patron of the arts.

**ATTALUS III,** called PHILOMETOR (171–133 B.C.). The son of Attalus II and Stratonice, wife of Eumenes II. He was adopted while still a boy by Eumenes. He became King of Pergamum in 138 B.C. As a king he is known to us chiefly for the extravagance of his conduct and the murder of his friends and relatives. On the other hand, he is represented as a dilettante in literature and art. He was sunstruck while supervising the erection of a monument to his mother and died of fever. His will made the Roman people his heirs, whence his name became proverbial for munificence and splendor.

**AT'TAR OF RO'SES,** or **OTTO OF ROSES.** The volatile oil of the petals of some species of rose. It is a nearly colorless or light yellow crystalline solid at temperatures below 80° F., liquefying a little above that temperature. It is imported from the East, where, in Syria, Persia, India, as well as in Turkey and Bulgaria, roses are cultivated to a considerable extent for the sake of the attar. In recent years it has also been prepared on a considerable scale in the northern European countries. The oil has been obtained from several species of rose. The *Rosa centifolia* is cultivated in western Asia; the *Rosa damascena* is cultivated in Bulgaria. To procure the attar the rose petals are usually distilled with about twice their weight of water, and the distillate is exposed to the cool night air in open vessels, from which the thin film of attar is skimmed with a feather in the morning. One part, by weight, of the oil is obtained from 3000 parts, by weight, of rose petals. Attar is said to have been first procured by what may be called an accidental distillation, rose petals having been exposed with water to

the heat of the sun, and to have been found floating on the surface of the water; and it is still sometimes obtained in India by such a process. It is said to be also obtained by dry distillation of rose petals at a low temperature. During the distillation of rose petals a small quantity of a solid volatile oil comes over (solid oil of roses, see below), which crystallizes and floats on the water in the receiver, and which is sometimes called *English oil of roses*. Attar of roses is not unfrequently adulterated with sandal-wood oil, oil of rhodium, geranium oil, etc. It is much used for making hair oil, a drop of it being enough to impart a pleasant odor to a considerable quantity. It is also used in making lavender water and other perfumes. The odor of attar itself is too powerful to be altogether pleasant. Attar of roses is a mixture of two substances, the one solid at ordinary temperatures and the other liquid. The solid oil of roses (rose camphor, stearoptene of oil of roses) possesses no odor, is insoluble in alcohol, but soluble in ether. It is composed of carbon and hydrogen. The liquid oil of roses, called *rhodinal* (eleoptene of oil of roses), is a very fragrant liquid, to which the attar of roses is indebted for its delicious perfume, and consists of carbon, hydrogen, and oxygen. Its composition is represented by the formula $C_{10}H_{18}O$, and it is believed to be identical with citral. The principal use to which attar of roses is put is as a perfume. Milk of roses and lavender water owe their fragrance to the presence of the attar. A good receipt for oil for the hair is olive oil, colored by alkanet, and scented by a few drops of attar, and this is very generally sold under the name of attar of roses. Medicines are occasionally perfumed by attar of roses, and it is sometimes added to unguents and spirit washes. See PERFUMERY.

**ATTAVANTE**, ät'tä-vän'tä (1452–c.1518). A Florentine miniaturist, perhaps the greatest illuminator of the Italian Renaissance. He was born at Castel Fiorentino, of a noble Florentine family. His master in the miniaturist's art is unknown, but he was influenced by contemporary Florentine painters, by Verocchio, and especially by Domenico Ghirlandajo. He passed his life in Florence, where the great book lovers of the day, the Medici, Duke of Urbino and Matthias Corvinus, King of Hungary, vied with each other in the possession of his works. He is last mentioned in 1517 and died soon after that date. His principal works are the illuminations of a missal now in the cathedral of Lyons (1483), another in the Royal Library of Brussels (1485) upon which the stadtholders of the Spanish Netherlands once took oaths of fealty; and Capella, *De Nuptiis Mercurii et philologiæ* (with graceful mythological illustrations) in the library of St. Mark's, Venice. Other great libraries of Italy, especially the Laurentian of Florence, abound in his works, which are also to be found at Vienna and Paris. The cathedrals of Florence and Prato possess beautiful antiphonaries. Although lacking in depth of feeling, Attavante's work is unequaled in beauty of ornament and freshness of color. Consult the articles "Attavante" in Bradley, *A Dictionary of Miniaturists* (London, 1887), and "D'Ancona" in Meyer and Thiemes, *Allgemeines Lexicon der bildenden Künstler*, vol. ii (Leipzig, 1908).

**ATTEMPT'**. An act, done with intent to commit a crime, and tending, but failing, to effect its commission, is punishable as an attempt to commit that crime. In England it has been held that the act must have been such that, if no interruption had taken place, the intended offense would have been committed, and therefore that one who, with intent to steal, put his hand into another's empty pocket was not guilty of an attempt. Such is not the law in this country. The emptiness of the pocket prevented a theft, but the attempt to commit a theft was complete. See the works mentioned under CRIMINAL LAW.

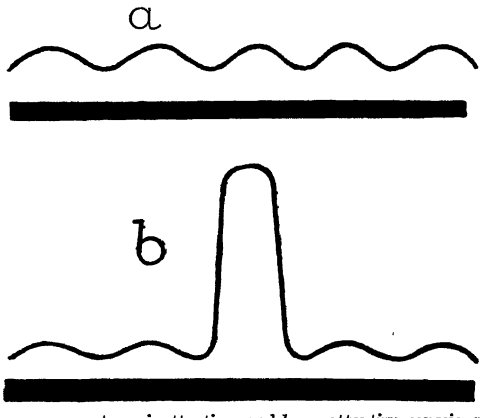
**ATTEN'TION** (Lat. *ad*, to + *tendere*, to stretch, reach out, to direct one's self, strive). The problem of attention is distinctly a problem of modern psychology. It is, of course, possible, now that the study of attention has been systematically undertaken, and its part problems discriminated, to find the germs of a psychology of attention in the descriptive works of the eighteenth century, to say nothing of still older treatises; just as it is possible, after Darwin, to find the germs of an evolutionary theory of life as far back as the old Greek philosophers. None the less the analysis and measurement of the attentive state are an achievement of the second half of the nineteenth century; and if there were no other justification for the much-abused phrase "the new psychology," we have its sufficient warrant in the addition of this vast area of previously unexplored territory to the psychological domain. Attention, which in the psychologies of the Associationist School, down to and including the monumental works of Bain, is either wholly neglected or passed over with a few general remarks, now forms the subject of a large monographic literature, has a chapter of its own in the text-books of the science, and holds the foremost place in many recent psychological systems.

We shall best understand the nature of the attentive consciousness, and of the problems which it sets for solution, if we set out from a concrete instance. Suppose that the mail brings me the latest popular novel, a book that I have for some time wished to read, and that I have heard constantly discussed by my friends. I know that I ought to work at other things, but I succumb, after a struggle, and sit down to the open book. At first I read hesitatingly and with effort; my neglect of duty still forces itself upon me from time to time, and I find the early chapters of the book difficult to follow. Presently, however, I become interested; later still, I become absorbed, oblivious to everything save the fortunes of the hero and heroine. I read on until the book is finished, and then wake up, almost with a start of surprise, to the business of the real world. What has happened, that is of psychological moment, during this experience?

In the first place, the general state or condition of my whole consciousness has changed. In the older psychologies the phrase "state of consciousness" is used as the equivalent of what is now termed, more correctly, "mental process"; ideas and emotions and desires were referred to as "states of consciousness." What is here meant is something very different. We speak of the "state" of consciousness, in strict usage, in the sense in which we speak of the state of the roads, as good or bad; or of the state of a man's affairs, as flourishing or embarrassed; or of the state of his health, as robust or shattered. Now it is clear that the state or disposition of consciousness, in discursive thought or reverie, differs from its state, understood in

this way, in concentrated attention. In the former case all the ideas which constitute the consciousness are on the same level, of the same mental value; in the latter, some ideas (those held at the focus of attention) are super-eminently "robust" or "flourishing," while the ideas not attended to are depressed, relegated to the background. Here, then, is a matter that requires accurate analysis. Secondly, there is a marked difference of mental experience, as the distracted, thwarted attention with which we begin the reading of the novel passes into the rapt and absorbed interest with which we continue to read. We are attentive in both cases; but if we are to judge by what we "feel," we can hardly give the same name, without qualification, to the two states of consciousness. In other words, there seem to be various forms or kinds of attention. Thirdly, the change of conscious state which comes with the concentration of attention brings with it a characteristic change of bodily attitude. We should all recognize a picture or statue that portrayed the scout (i.e., the attitude of visual attention), or the eavesdropper (the attitude of auditory attention). These attitudes naturally give rise to certain characteristic groups of organic sensation—of sensations from skin and muscle, tendon and joint; and we shall therefore expect to find such sensations playing a constant and important part among the sense processes that form the background of the attentive consciousness.

1. We will take up these topics in order, beginning with attention as a state of consciousness. What are the essential features of the attentive state? (*a*) The ideas attended to are more clear and distinct than the ideas simultaneously present, but neglected by the attention, or, as we may say, attended from. The




*a* represents an inattentive, and *b*, an attentive consciousness. In *a* are five ideas, all proceeding at equal levels. In *b*, the third idea is being attended to, and the height of its wave is increased, while the other waves are depressed.

processes at the focus of attention are readily discriminated; the ideas of the background are obscure. (*b*) If the ideas attended to are intrinsically weak, they are strengthened or intensified by attention. A faint sound or light is rendered louder or brighter as we attend to it. No such intensification is observable in the case of ideas whose stimuli are intrinsically strong. (*c*) If the ideas attended to are fleeting and transient, they can be lengthened, made more durable, by attention. No such lengthening is observable in the case of ideas whose stimuli are stable and permanent. Lastly, (*d*) the ideas attended to are more valuable for the general mental life than are the ideas attended from; they are more easily and certainly revivable, in memory or imagination. It is a commonplace of education that if we wish a child to remember something, we must make him attend to it. This fourth characteristic is, evidently, of a different order from the three preceding. It is a result or after effect of the others, and more especially of (*a*).

As to the physical basis of these changes in consciousness, it has long been known that certain nervous impulses within the central nervous system have the power of inhibiting or arresting other impulses; thus, excitation of the vagus (pneumogastric, or tenth cranial) nerve inhibits the beating of the heart (Weber). Now we can account for some of our observed phenomena by a theory of inhibition. When, e.g., a weak mental process is strengthened, or a transient process lengthened, we may well suppose that the effect is due, not to any positive reinforcement or temporal extension of the process in question, but simply to the simultaneous arrest of other and conflicting excitations within the nervous system. Attention, that is to say, allows the weak or transient process to come to its full intensive and temporal rights in consciousness by keeping down other nervous impulses whose tendency is still further to weaken or curtail that process. Attempts have been made, in the same way, to explain the growth of clearness and distinctness in the leads attended to by assuming an inhibition of conflicting ideas; so that the clearness of the attentive state would represent the normal or natural clearness of the idea, the clearness which it can attain when its development is not hindered by rival ideas. Physiologists, however, have recently discovered that, just as certain nervous impulses may arrest other impulses, or block paths of nervous discharge, so may certain impulses reinforce others, or open up paths of nervous discharge; the negative fact of inhibition is paralleled by the positive fact of facilitation. There seems to be no reason why we should not avail ourselves of this discovery for our theory of attention. The clearness of the idea attended to would then depend partly upon the arrest of conflicting ideas, but partly also upon an actual enhancement of the focal idea by the reinforcing nervous impulses. Such a view accords better with the observed mental phenomena than does the view which regards all the aspects of the attentive state as symptoms of neural inhibition. On the question of the primary seat of the inhibitory and facilitating impulses, no more can at present be said than that it is, probably, to be sought in the "association centres" of the cerebral cortex. See NERVOUS SYSTEM.

Two special questions arise out of the foregoing discussion. We may ask, in the first place, how long the state of attention continues, for how long a time an idea or group of ideas may remain poised at the apex of conscious clearness. And we may ask, secondly, how large the group of ideas attended to may be; inquiring now into the range of attention, as we have before inquired into its duration. Both questions have been submitted to the test of experiment. It has been found (*a*) that the sensations aroused by "nominal" stimuli, i.e., by stimuli which can hardly be seen or heard or felt, or barely be discriminated from other coexistent stimuli, are

not continuous but intermittent. Suppose that we look attentively at a faint gray patch on a white surface, or listen attentively to the faint hiss of a gas flame. If the attention remains steady, the gray and the hiss (other things being equal) will also remain steadily in consciousness. If, on the other hand, the attention fluctuates, there will be moments when the gray and the hiss undergo a loss of clearness; and since they are, at the best, only just visible and just audible, the loss of clearness will mean a loss of existence: the gray will merge into the white and the hiss will cease to be heard. Now the second alternative is realized. The gray appears, and is washed out, and appears again, at intervals of a few seconds; and so with the sound of the flame. If, then, we may take these results at their face value, attention is intermittent, and a single "pulse" or "wave" of attention lasts for only five or six seconds. It is doubtful, however, whether other things *are* equal, and whether the fluctuation of sensation is not rather due to variation in the state of the sense organ. Opinion is still divided, but the present tendency is toward a peripheral rather than toward a central explanation of the phenomena. The question of the normal duration of attention must therefore be left open. (*b*) The range of attention is most easily determined by the aid of visual stimuli. A number of letters, e.g., chosen at haphazard and set in a space that falls well within the observer's range of vision, are shown upon a screen for so short a time that wandering or roving of the attention from letter to letter is prevented. Under such conditions it is possible to grasp, by a single "act" of attention, some five or six separate impressions. If short and familiar words are exhibited, in place of the mixed letters, some four or five of these will be grasped by the attentive consciousness. The number of discriminable ideas present at the same time with the four or five focal ideas in the background of consciousness cannot, in the nature of things, be accurately ascertained. See CONSCIOUSNESS.

The physical basis of an intermittence of attention might be sought in the mode of functioning of the nerve cell. The cell is said by physiologists to "discharge." We may interpret the term literally, for the nerve cell is a storehouse or reservoir of nervous energy, and gives off this energy when the appropriate stimulus arrives, not continuously or piecemeal, but all at once, by way of explosion. Now an exploded cell must be recharged before it can function again, and the period of recharging may perhaps correspond to the periods of disappearance of the pale gray and the faint hiss of which we have spoken. In explanation of the limited range of attention, we can say no more than that the small group of ideas comprised within it represents the available energy of the total cortex, as directed upon the given stimuli; the fact of limitation must be considered as an ultimate fact of the psychophysical organization.

2. We pass to the question of the various forms or kinds of attention. It may be said at once that there is but one attention. The essential features of the attentive state are, always and everywhere, as we have just described them. The differences between one bit of attentive experience and another are differences, first, in the determination or motivation of attention; and secondly, in the sense processes which are set up by the attentive attitude. We deal now with the determinants of attention. (*a*) There are certain stimuli and forms of stimuli which command our full and immediate attention. Thus, very intensive stimuli compel us to pay regard to them. However interesting our novel may be, we shall start up, automatically and unhesitatingly, if a gun is fired outside of the window of our room. We have no choice but to attend to the sudden, loud sound. Intensity, suddenness, novelty, movement—all these properties of stimuli are attention-compelling. The moving bird that flits across the landscape; the moving voice that rises and falls to the more stationary orchestral accompaniment; the moving stimulus in the field of touch—these things hold our attention whether we will or no. There is good physiological reason for the power of such stimuli, inasmuch as all alike are fitted by their attention-compelling properties to exert a marked influence upon nervous substance. There is also good biological reason for their efficacy. An animal so constituted as to leave unnoticed the sudden and novel and moving features of its surroundings would soon pay the forfeit of its neglect with life. This "primary passive attention," or "involuntary attention," is, then, a heritage from earlier and less secure conditions of living. Our ancestors could not have survived without it, and it persists, ingrained in our nervous constitution, even though in civilized communities the reason for its continuance has largely disappeared. (*b*) This single and masterful determination of attention, however, cannot persist unchanged. The organism grows in complexity; its sense organs multiply. And this means that there may be rival claimants, so to speak, for the favors of attention. Suppose that eye and ear are simultaneously called upon—the eye by a moving object in one direction, the ear by an intensive sound proceeding from a different quarter. There will, evidently, be doubt and conflict, of a piece with the doubt and conflict that are set up by the occurrence of a number of potential motives to selective action. (See ACTION.) Furthermore, as the retrospective functions develop, and the mind is stocked with memories, each of the would-be determinants of attention will form a centre of association; ideas will cluster round it, some to help and some to hinder. So we reach the stage of "active" or "voluntary attention"—the sort of attention that we give to a new game of skill that we are learning, or a new problem that we are seeking to solve. Here the attention is divided; no single set of ideas receives a full measure of it; there is effort and struggle and misdirection of energy. Again, however, attention cannot persist, unchanged, at this level. If the struggle be continued active attention passes, inevitably, into (*c*) "secondary passive attention." Just as the selective action slips back, with repetition, into a secondary reflex, so does active attention presently fall under the exclusive dominance of some one of the rival determinants. We begin the novel voluntarily, in face of conflicting duties. As we read we grow absorbed in the story. What is this "absorption" but a reappearance of primitive attention upon a higher plane of mental development? The attention-compelling property of the successful stimulus is no longer intensity or novelty, but something much more subtle. It is the relation of the stimulus in question to the whole content of consciousness. As soon as our mind is set for the plot of a novel, and all intruding ideas

have been banished, the incidents, as they come, have full sway over us; we are prepared for them, ready to receive them; they fit in with our mental trend and tendency. Every trained mind is thus dominated by the objects which appeal to its training; the poet, by works of the creative imagination; the physician, by the details of a new treatment; the painter, by an effect of color upon the landscape; the zoölogist, by the forms of animal life. We can never transcend the dictates of the primary passive attention; the most absorbed reader, the most abstracted thinker, starts at the sound of the gun. But our intellectual life, when it has reached the stage of achievement, is in the main a life of secondary passive attention. From the educational point of view the stage of active attention is a stage of waste, of non-attainment; mastery comes with secondary passive attention. But then, there is no road to this last save through active attention: work comes before play. The child must be led to work in order that his play, in adult life, may be of the highest possible service to society.

3. Little need be said of the sense processes that are aroused by the bodily attitude of attention, the strains and pressures that come to consciousness from eye or ear, as the attention is visually or auditorily directed. Some psychologists, envisaging attention as a purely motor phenomenon, have laid much stress upon these muscular adjustments; and there can be no doubt that they help to induce and to maintain the attentive state. But while this is true, it seems to be equally certain that the sensations which proceed from the adjustments are merely secondary characteristics of the attentive consciousness. As Kuelpe puts it, they are consecutive, not constitutive. They contribute largely to the experience of effort in active attention. And it is interesting to notice, as Fechner and James have done, the change of direction which this effort undergoes, according as the object of attention belongs to the world of things or to the world of thought. In the former case it is a straining outward; in the latter, a strained retraction or withdrawal inward. Further study of the sensations, however, throws no new light upon the mechanism of attention.

**Bibliography.** W. James, *Principles of Psychology* (New York, 1890); O. Kuelpe, *Outlines of Psychology* (London, 1909); W. Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1911); Th. Ribot, *La psychologie de l'attention* (Paris, 1889); E. B. Titchener, *Experimental Psychology* (New York, 1901); *Psychology of Feeling at Attention* (New York, 1908). See APPERCEPTION; and (for the relation of attention to affection) WILL. See also PSYCHOLOGICAL APPARATUS.

**ATTERBOM,** ät'tĕr-bōm, PER DANIEL AMADEUS (1790–1855). A Swedish poet. He was born at Åsbo. As a student he fell under German literary influence, and was a founder of the *Musis Amici*, a student society which, under the name of *Aurora League*, helped to emancipate Swedish literature from the dominance of French academic tradition, through its organs, *Phosphorus* (1810–13), *Poetic Calendar* (1812–22), and *Swedish Literary News* (1813–24). The Aurora League counted among its members S. Hedborn, W. Palmblad, and other men of equal distinction. Broken in health by overstudy, Atterbom visited Germany and Italy in 1817–19, where he met Schelling and Thorwaldsen. On his return he became (1820) instructor to the Crown Prince Oscar, and (1828) professor of philosophy at Upsala. In 1839 he was made Academician. He wrote critical literary essays, *Swedish Seers and Poets* (*Svenska Siare och Skalder*, Upsala, 1841–43); a collection of lyrics, *The Flowers*, in which he introduced the sonnet to Swedish poetry; an unfinished but exquisite fairy drama, *The Blue Bird* (*Fogel Blå*); and the very popular romantic drama, *The Isle of Blessedness* (*Lycksalighetens Ö*, 1823). He possessed rare poetic gifts, but introduced into his verses metaphysical and religious speculation. His *Collected Poems* appeared in 1854–63 and his *Works* in 1859–70.

**AT'TERBURY,** FRANCIS (1662–1732). Bishop of Rochester. He was born at Middleton Keynes, near Bedford, England, March 6, 1662, and educated at Westminster School, London, from which, in 1680, he passed to Christ Church, Oxford. In 1687 he gave proof of that ready controversial talent which distinguished him through life, in a reply to a pseudonymous attack on Protestantism by Obadiah Walker, Master of University College, under the name Abraham Woodhead, and in the same year received holy orders. In London his rhetorical powers soon won him reputation. He became lecturer of St. Bride's (1691), a royal chaplain, and minister of Bridewell. In 1698 a temporary sensation was created in the learned world by the appearance of the *Hon. Charles Boyle's Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris and the Fables of Æsop*, in which he defended the Epistles, now known to be forgeries. This clever but shallow and malicious performance was in reality composed chiefly by Atterbury, who had been the young gentleman's tutor at Christ Church. In 1700 he distinguished himself in a controversy with Dr. Wake and others regarding the powers and privileges of convocations. Atterbury's zealous and caustic defense of the ecclesiastical against the civil authority procured him the thanks of the lower house of Convocation and the degree of D.D. from Oxford (1701); also the archdeaconry of Taunton. In 1704 he was promoted to the deanery of Carlisle, on which occasion he subjected himself to just obloquy by attempting to procure an alteration in the date of his predecessor's resignation, which happened to interpose a temporary obstacle to his appointment. In 1707 he was made a canon of Exeter; in 1709, preacher at the Rolls Chapel; in 1710 he was chosen prolocutor to the lower house of Convocation, and in the same year he had the chief hand, according to the common belief, in drawing up the famous defense of Dr. Sacheverell; in 1712 he became Dean of Christ Church, where, however, his turbulent and combative spirit had meanwhile involved him in so many controversies that there was no peace until he was removed; in 1713 he was made Bishop of Rochester and Dean of Westminster. It was supposed—not unreasonably—that Atterbury aspired to the primacy; but the death of Queen Anne extinguished his hopes in that direction. His known character and Jacobite leanings made him no favorite with George I. In 1715 he refused to sign the bishops' declaration of fidelity, and some of the most violent protests of the peers against the government measures proceeded from his reckless pen. His deep complicity in a succession of plots for the restora-

tion of the Stuarts brought down upon him at length the charge of treason, and in August, 1722, he was committed to the Tower. A bill of pains and penalties was brought into the House of Commons, and passed in the Lords by a majority of 83 to 43. Atterbury, who had defended himself with great ability, was deprived of all his ecclesiastical offices, incapacitated from holding any civil or spiritual office in the King's dominions, and condemned to perpetual banishment. The people generally considered him a martyr. In June, 1723, he quitted England for France, and after a short stay at Brussels, finally settled at Paris, where he died Feb. 15, 1732. In his exile he maintained a constant correspondence with his friends and took an active part in the abortive conspiracies of the Jacobites. His fame as a writer is founded on his sermons, and his letters to Pope, Swift, and others; as a letter-writer, indeed, he has seldom been surpassed. Consult his *Memoirs and Correspondence*, ed. by F. Williams (London, 1869); his *Life*, by Beeching (London, 1909).

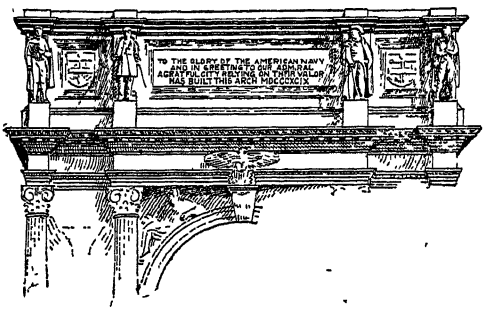
**ATTERBURY,** William Wallace (1866—). An American railway official, born at New Albany, Ind. He graduated from Yale University in 1886 and in the same year began railway work as an apprentice in the Altoona shops of the Pennsylvania Railroad. He was rapidly promoted, until in 1896 he was appointed general superintendent of motor power on the Pennsylvania lines east of Pittsburgh and Erie. The general management of these lines he undertook in 1903. Six years later he became fifth vice-president of the Pennsylvania Railroad, with special charge of transportation, and then in 1911 fourth vice-president. He was made a member of several learned and scientific societies. In 1913 he served as one of three members of a board of arbitration appointed to adjust firemen's demands.

**ATTERSEE,** ät'tĕr-zā, or **KAMMERSEE,** käm'mĕr-zā. A lake in the southwestern part of Upper Austria, situated in long. 13° 30′ E., 1525 feet above the sea. It is over 11 miles long, from 1 to 2 miles in breadth, and occupies an area of 17 square miles. It is surrounded by mountains, and the scenery is remarkable for its picturesqueness. A number of health resorts are situated on the shore. The lake is well stocked with fish. It has been navigable by steamers since 1869.

**AT'TESTA'TION** (Lat. *ad*, to + *testis*, a witness). The verification in writing of the execution of deeds and wills by witnesses. Hence the clause at the end of these instruments, which immediately precedes the signatures of the witnesses, is called the attestation clause. See Deed; Will; Witness.

**ATT'FIELD,** John (1835–1911). An English chemist, born in Hertfordshire. He was professor of practical chemistry to the Pharmaceutical Society from 1862 to 1896. He contributed numerous articles on chemical topics to *Brande's Dictionary* and to the *English Cyclopædia;* was co-editor of the *British Pharmacopœia* in 1885 and editor in 1898; he is the author of *A Manual of Chemistry, General, Medical, and Pharmaceutical* (1898), and a large number of scientific papers.

**AT'TIC** (properly an adjective, from Gk. *Ἀττικός*, meaning 'in the chaste Attic style'). A term in architecture, employed to designate a low story rising above the wall cornice that terminates the main elevation of a building, or a low story at the top of a building. In classic architecture it designates a decorative story above an entablature, as in the case of Roman



ATTIC OF THE TEMPORARY DEWEY ARCH, NEW YORK.

triumphal arches, where the dedicatory inscription was in the centre of the attic.

**ATTIC.** Pertaining to Attica, characteristic of the people of Athens, or Attica. From the preëminence of Athens in Greek literature, from the fifth century B.C., the Attic dialect became the usual literary language and exercised a powerful influence in the *κοινή, koinē*, or "common" form of Greek, which developed after the time of Alexander the Great. In the first and second centuries A.D. a revival of Attic took place among the so-called Atticists, of whom Dionysius of Halicarnassus and Lucian are conspicuous representatives. The tragedians, and perhaps Thucydides, seem to preserve traces of a somewhat older form of Attic dialect than that used by writers of the fourth century B.C. Sophocles was called "the Attic bee," from the sweetness of his compositions; the nightingale was the "Attic bird," because Philomel was the daughter of a king of Athens; Xenophon was styled the "Attic muse" for eloquence in composition. "Attic salt" indicates pungency of wit. In architecture the word is used (*a*) as an adjective to designate a type of base used in the Ionic and sometimes in the Corinthian order, consisting of two tori separated by a scotia (see Molding); (*b*) as a noun, to designate a supplementary story above the main cornice, interposed between it and the roof; and (*c*), in more colloquial usage, either as a noun or adjective, to designate the space within a high-pitched roof, whether used as a garret or divided into habitable rooms.

**AT'TICA** (Gk. *Ἀττική, Attikē*, earlier, *Ἀκτική, Aktikē*, from *ἀκτή, aktē*, headland, promontory, coastland). The eastern extremity of the mainland of Greece. It forms a triangular peninsula extending to the southeast into the Ægean Sea, washed on the southwest by the Saronic Gulf, and on the northeast by the strait separating it from Eubœa. On the north it is separated from Bœotia by Mount Cithæron (4620 feet) and its eastern continuation, and on the west from Megaris by a low range of hills. The soil of Attica is thin and poor and the supply of water scanty, while the character of the coast, with its numerous harbors and adjacent islands, tended to attract the inhabitants to the sea. The climate and the purity of the air have always been celebrated. Though Attica was always dependent on imported grain, the natural resources were considerable. Mount Pentelicon yielded an abundant supply of fine white marble, and Hymettus blue marble. The silver mines of Lau-

rium, at the southern end of the peninsula, were a valuable property of the Athenian state. The olive was of great importance in Attica; the fig, too, flourished there. Hymettus was famous for its honey. Attica is much broken up by mountain ridges, and there are only two large plains, the Athenian, surrounded by Mounts Hymettus (3370 feet) on the southeast, Pentelicon (3640 feet) on the northeast, Parnes (4634 feet) on the north, and Ægaleos on the west; and the Thriasian, around Eleusis, in the southwestern portion. The principal rivers, the Cephissus and Ilissus, both in the Athenian plain, are mere winter torrents, dry in summer, when no rain falls for four months. In the modern administration Attica forms one of the nomes of Greece.

The ancient Athenians claimed that their ancestors were *autochthones*, "sprung from the soil," and it is certain that Attica does not show the same evidences of invasion that are found in other Greek states. Thucydides declares that Attica had naturally remained in the hands of the same people, since its soil was too infertile, comparatively, to offer attraction to invaders. (See AUTOCHTHONES.) It is also certain that the Athenians were a branch of the Ionic division of Greek-speaking peoples. It seems clear that originally Attica was inhabited by a number of independent clans, bound together in a loose confederacy, which was changed, either by a gradual process or, more probably, by an Athenian king, into a real unity under the lead of Athens. This union was attributed in Athenian legend to Theseus, and was so thoroughly accomplished that the history of Attica is only that of Athens. Eleusis alone seems to have preserved an independent position until a comparatively late date. The villages, or *demes*, were reorganized by Clisthenes (509 B.C.), who divided them among his 10 tribes so that each tribe contained demes from the plains, the mountains, and the coast, thus destroying the last traces of local parties and completing the centralization of the Athenian state. Consult: Curtius and Kaupert, *Karten von Attika* (Berlin, 1881–97); Leake, *The Topography of Athens and the Demi of Attica* (London, 1841); Chr. Wordsworth, *Athens and Attica* (London, 1869); J. G. Frazer, *Pausanias's Description of Greece*, vol. ii, v (London, 1898); E. A. Gardner, *Ancient Athens*, chap. i (New York, 1902). See also ATHENS; ELEUSIS; GREECE; HYMETTUS; MARATHON; PHALERUM; PIRÆUS.

**ATTICA.** A city in Fountain Co., Ind., 70 miles (direct) northwest of Indianapolis, on the Wabash and the Chicago and Eastern Illinois railroads (Map: Indiana, B 2). It manufactures proprietary medicines, bricks, and bridges. Attica was settled in 1827 and was first incorporated in 1867. It was chartered as a city in 1905 by a general law, which provided for a mayor, elected quadrennially, and a unicameral council. The electric light plant is owned and operated by the municipality. Pop., 1890, 2320; 1900, 3005; 1910. 3335.

**ATTIC MUSE, THE.** A name given to Xenophon (q.v.), because of his style and because of the appreciation of and enthusiasm for the noble and beautiful which marked his character.

**ATTIC SALT** (Lat. *Sal Atticum*). A poignant, delicate wit, peculiar to the Athenians. In like phrase, the ruder Roman wit is called *Italian vinegar* (*Acetum Italicum*).

**ATTICUS, TITUS POMPONIUS** (109–32 B.C.). A Roman litterateur. He was born six years before Cicero. His excellent education, during which he enjoyed the companionship of Torquatus, the younger Marius, and Cicero, developed, at an early age, a love of knowledge, which was increased during his stay in Athens, where he remained many years (86–65), aloof from political distractions. It was through his stay in Athens that he won the cognomen Atticus. After 65, when he returned to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take any part in political affairs. Yet he was by no means without influence on public matters, as he lived on terms of familiar intercourse with several leading statesmen, regardless of their political leanings, and freely gave his counsel, which was generally sound and wholesome, while it was always benevolent. He was a man of great wealth, having been left a large inheritance by his father and his uncle, which he greatly increased by judicious mercantile speculations. His mode of life was frugal. When he was informed that a disorder under which he was laboring was mortal, he voluntarily starved himself. Among his personal friends Cicero held the first place. The *Annales*, a chronicle of Roman history, written by Atticus, were highly commended by his contemporaries. They were especially valuable on account of containing genealogical histories of the old Roman families. He also wrote a history in Greek of Cicero's consulship. Atticus was one of those men (not uncommon either in ancient or modern times) in whom fine culture and a fortunate social position had highly developed the faculty of good taste. He had no creative genius, but was possessed of such delicate discernment that he could detect the flaw which would have been invisible to Cicero. Every author was anxious to secure his favorable opinion. None of his writings has been preserved. He had a large library and a force of slaves engaged in copying and publishing the writings of his contemporaries, among them Cicero. His biography is found in Cornelius Nepos; and many facts concerning him in Cicero's *Epistles to Atticus*.

**ATTICUS HERO'DES, TIBERIUS CLAUDIUS.** 1. A rich Athenian who lived at the end of the first and beginning of the second century A.D. His father was found guilty of treason and his property confiscated; but Atticus found a rich treasure in a house, and the Emperor permitted him to keep it. He rose to high honor under Trajan and Hadrian, and was twice Consul. 2. Son of the preceding, born about 101 A.D. at Marathon. Carefully trained by the best teachers, he became a noted rhetorician, and at Rome numbered among his pupils M. Aurelius and L. Verus. In 143 he was Consul, but soon afterward returned to Athens. To the wealth inherited from his father he added by a marriage with Annia Regilla. He spent his money liberally in adorning the city of Athens, where he built a stadium of Pentelic marble, and the Odeum (a music hall), whose ruins still stand to the southwest of the Acropolis, in memory of Regilla. He also built an aqueduct and exedra at Olympia, a stadium at Delphi, a theatre at Corinth, at Thermopylæ arrangements for sulphur baths, and at Canusium in Italy an aqueduct. He contemplated a canal across the Isthmus of Corinth, but gave it up because Nero had tried and failed. He restored several of the partially ruined cities of Greece, where inscriptions testified the public gratitude to him. For

some reasons the Athenians became his enemies, and he left the city for his villa near Marathon, where he died (177). He wrote many works, but nothing of his writing is known to exist.

**ATTILA,** ăt'tĭ-la (Ger. *Etzel;* Hung. *Ethele,* conjectured to have been originally a title of honor). A King of the Huns, the son of Munzuk, a Hun of the royal blood. In 434 A.D. he succeeded his uncle, Roas, as chief of countless hordes scattered over the north of Asia and Europe. His brother, Bleda, or Blödel, who shared with him the supreme authority over all the Huns, was put to death by Attila in 444 or 445. The Huns regarded Attila with superstitious reverence; Christendom held him in superstitious dread, as the "scourge of God." He was believed to be armed with a supernatural sword, which belonged to the Scythian god of war and which must win dominion over the whole world. It is not known when the name "scourge of God" was first applied to Attila. He is said to have received it from a hermit in Gaul. The Huns as a race were regarded in the same light; in an inscription at Aquileia, written a short time before the siege of that city in 452, they are described as *imminentia peccatorum flagella* (the threatening scourges of sinners). The Alani, Ostrogoths, Gepidæ, and many of the Franks fought under his banner, and in a short time his dominion extended over the people of Germany and Scythia—i.e., from the frontiers of Gaul to those of China. In the first years of his reign Honoria, the granddaughter of Theodosius II, because of an intrigue with an officer of the palace, appealed to Attila for help, and offered herself to him in marriage. Though he did not marry her, he used her appeal as one of the grounds of his attacks on the Empire. In 447, after an unsuccessful campaign in Persia and Armenia, he advanced through Illyria and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The Emperor Theodosius II collected an army to oppose the inundation of the barbarians, but in three bloody engagements fortune declared against him. Constantinople owed its safety solely to its fortifications and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; 70 flourishing cities were desolated, and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451 Attila turned his course to the west, to invade Gaul, but was here boldly confronted by Aëtius, leader of the Romans, and by Theodoric, King of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian Fields—waited to meet the enemy. Here the army of the West, under Aëtius and Theodoric, encountered the forces of the Huns. The engagement is known in history as the battle of Châlons. Both armies strove to obtain the hill of moderate height which rises near Mury and commands the field of battle; and after a terrible contest the ranks of the Romans and their allies, the Visigoths, were broken. Attila now regarded victory as certain, when the Gothic prince, Thorismond, immediately after his father had fallen, assumed the command and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and Attila with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the most sanguinary battle ever fought in Europe; for it is stated by contemporaries of Attila that not fewer than 252,000 or 300,000 slain were left on the field. Attila, having retired within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pile, resolving to die in the flames rather than surrender; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. (See AËTIUS.) In the following year Attila recovered his strength and made another incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, the Apennines, and the lagoons of the Adriatic Sea, where they founded Venice. The Roman Emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I, who visited the dreaded barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans; and old chroniclers relate that the Apostles Peter and Paul visited the camp of Attila and changed his purpose. By 453, however, Attila appears to have forgotten the visit of the two beatified apostles, for he made preparations for another invasion of Italy, but died of hemorrhage on the night of his marriage with the beautiful Ildiko (or Hilda). His death spread consternation through the host of the Huns. His followers cut themselves with knives, shaved their heads, and prepared to celebrate the funeral rites of their King. It is said that his body was placed in three coffins, the first of gold, the second of silver, and the third of iron; that the caparison of his horses, with his arms and ornaments, was buried with him; and that all the captives who were employed to make his grave were put to death, so that none might betray the resting-place of the King of the Huns.

The Gothic historian Jornandes describes Attila as having the Mongolian characteristics—low stature, a large head, with small, brilliant, deep-seated eyes, and broad shoulders. There can be little doubt that circumstances conspired, in the case of Attila, to give a certain largeness to his barbaric conceptions, which made him a most formidable foe to the civilization of Europe. Consult: Gibbon, *Decline and Fall of the Roman Empire* (London, 1854–55); Thierry, *Histoire d'Attila* (Paris, 1874); *The Cambridge Mediæval History,* vol. i (New York, 1911). See HUNS.

**ATTIN.** See ATTIS.

**ATTIRET,** ä'tē'rā', JEAN DENIS (1702–68). A French painter. He was born at Dôle, studied painting in Rome, and at 30 entered the Jesuit Order. He was sent as a missionary to China, where he became court painter to the Emperor Kien Lung, whose military exploits against the Tatars he treated in 16 historical paintings. These were reproduced in France by Cochin in the form of engravings. Attiret painted more than 200 portraits of Chinese court officials and was the founder of a European school of painting at Peking. The title of mandarin was offered to him in 1754 but refused.

**AT'TIS, A'TYS,** and **AT'TIN** (Gk. Ἄττις, Ἄττυς, Ἄτυς, and Ἄττιν).

A Phrygian and Lydian divinity, worshiped in the temple of Cybele in common with this goddess. The myth of Attis is told in various ways. The form of the story given by Ovid (*Fasti*, iv, 223–372) is this: Attis was a beautiful shepherd beloved of Cybele, who imposed upon him the vow of chastity. Having broken his vow, he was made insane by the goddess, in which condition he unmanned himself. When, in consequence thereof, he attempted to kill himself, Cybele changed him into a fir tree, and decreed that henceforth her priests should be eunuchs. The myth represented the successive death and regeneration of nature, due to the changes of the seasons. The cult of Attis was native to Phrygia, but at an early date it spread into other parts of Asia Minor and the Greek islands. Traces of it appear at Athens as early as the fourth century B.C., and it was introduced at Rome, probably in conjunction with the cult of Cybele, in 204 B.C. After the official recognition of the cult by the Emperor Claudius the festival of Attis was celebrated in March with great pomp. The story of Attis is the subject of a remarkable poem by the Roman poet, Catullus. Consult: J. G. Frazer, *Adonis, Attis, Osiris* (1906); G. Showerman, *Great Mother of the Gods* (Madison, Wis., 1901); and the editors of Catullus lxiii, especially R. Ellis.

**ATTIUS**, ăt'tĭ-ŭs, or **ACCIUS**, ăk'shĭ-ŭs, LUCIUS (c.170–90 B.C.). A Roman tragic poet. He exhibited his first play at the age of 30, continuing from that time till his death his literary labors. He was perhaps the greatest of the Roman tragic writers. He wrote about 40 tragedies, of which only about 750 lines are extant. He composed also *Annales*, mythological histories in hexameter verse, *Didascalia*, a history of Greek and Roman poetry, and a work called *Pragmatica*, treating of literary history. He wrote also on agriculture. The extant fragments are edited by Ribbeck, *Tragicorum Romanorum Fragmenta* (Leipzig, 1897). Consult the monograph by Boissier, *Le poète Attius* (Paris, 1857).

**ATTLEBORO.** A town in Bristol Co., Mass., 32 miles southwest of Boston; on the main line and on branches of the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). It comprises several villages and contains a public library, an almshouse, a State armory, and the Attleboro Home Sanitarium. The town manufactures jewelry, buttons, silverware, cotton goods, cotton-goods machinery, yarn, carriages, leather, coffin trimmings, and shuttles. There are also extensive bleacheries and dyehouses, and gold and silver refineries and smelters. The government is administered by annual town meetings. The water works are owned and operated by the municipality. Pop., 1900, 11,335; 1910, 16,215; 1920, 19,731. Settled in 1669, and originally a part of Rehoboth, Attleboro (named from Attleborough, England) was incorporated as a separate town in 1694. Consult J. Daggett, *A Sketch of the History of Attleborough* (Boston, 1894).

**ATTLMAYR**, ä't'l-mīr, FERDINAND (1829–1906). An Austrian naval expert. He was born at Hall, in the Tyrol, served with distinction in the navy, and in 1866 became professor at the Imperial Naval Academy of Austria. He produced a number of valuable works, principally on naval tactics, among which the following are the most important: *Die Elemente des Internationalen Seerechts* (1872); *Studien über Seetaktik und den Seekrieg* (1878); *Handbuch der Oceanographie und maritimen Meteorologie* (1883); *Ueber maritime Kriegsführung* (1884); *Der Krieg Oesterreichs in der Adria, 1866* (1896); *Ueber Maritime Strategie und Seekriegsrecht* (1901); *Das International Seerecht* (1903–04).

**ATTORNEY**, ăt-tûr'nĭ (OF. *atorne;* Low Lat. *attornatus*, turned to). A person upon whom authority has been conferred to act for another. If the authority is conferred by a letter or power of attorney, he is called an *attorney in fact*, or an agent (q.v.). If he is authorized by law to represent persons employing him in legal proceedings, he is called an *attorney at law*. In the latter sense it was confined in England, until recently, to lawyers practicing in the common-law courts. Those practicing in equity courts were called solicitors (q.v.), while admiralty lawyers were known as proctors (q.v.). The Judicature Act of 1873 declared that all persons theretofore admitted as attorneys, solicitors, or proctors should be called solicitors of the Supreme Court, and that all persons thereafter admitted should have the same name. Accordingly, attorney at law is an obsolete term in England.

In this country, on the other hand, it is used as the general designation of the practicing lawyer, without regard to the court in which he exercises his functions and without regard to the nature of those functions—whether they are those performed, on the one hand, by the English attorney, solicitor, and proctor, or, on the other, by the barrister (q.v.), counsel, and advocate. The qualifications of an attorney at law and the mode of his admission to the bar are fixed by statutes and by court rules. He is required, generally, to pursue a course of study, either in a law school or in the office of a practicing lawyer, to pass an examination, and to present credentials of a good moral character. His admission is by an order of the court, which has the force of a judicial determination of his fitness and of his authority as an attorney and counselor. Upon this determination he becomes an officer of the court, subject to its control and responsible to it for misconduct. He is not a public official, nor is he the possessor of a mere favor or indulgence, revocable at the pleasure of the court or of the Legislature. The order of the court admitting him as an attorney clothes him with a right which can be taken from him only by a judgment of the court, after an opportunity to be heard, for moral or professional delinquency. As a rule, only citizens who have attained the age of 21 years are admitted to the bar. In some States women are declared ineligible as attorneys at law, but the present tendency in this country is to hold them eligible. It is usual for State and Federal courts to admit to their bar, without an examination or formal certificate of character, persons who have practiced as attorneys of the highest courts of their respective States for three years or more.

Upon admission, the attorney is required to take an oath that he will demean himself, as an attorney and counselor of the court, uprightly and according to law, and that he will support the constitution of the State and of the United States. Toward his client the attorney stands in a fiduciary position. The client confides in him, and he is bound not to betray this confidence, but to observe the utmost good

faith in all matters connected with their relations. Moreover, he is bound to use reasonable care and skill in giving advice to his client and in conducting legal proceedings in his behalf. He is entitled to reimbursement by his client for all proper expenditures on the latter's behalf, and to a fair compensation for his services, in the absence of a special agreement on that point. The better to secure him in this right, the law accords him a lien on the client's papers or property which come into his possession in his professional capacity.

While an attorney is bound to his client to act with all reasonable skill and zeal in advancing the latter's interests, he is also under a duty toward third persons to act lawfully. No amount of zeal in his client's behalf will justify him in engaging, knowingly, in an unlawful act, such, for example, as instituting a suit which he knows is malicious and without probable cause. In conducting a litigation he may take a good deal of latitude; he may say much which is derogatory to the reputation of others; but, in this country, his remarks are not absolutely privileged; they must be pertinent to the subject-matter of the litigation. If they are not pertinent and are defamatory, he will be liable to an action for defamation (q.v.). Consult Weeks, *Treatise on Attorneys and Counselors at Law* (San Francisco, 1892). See BAR; BARRISTER; LAWYER.

**Attorney-General.** In England the chief law officer of the crown, and, by reason of his office, the titular head of the bar. As the legal adviser of the crown and of the various governmental departments, and as a cabinet minister, he possesses great authority and dignity. His salary is £7000 per annum, and he is not allowed to engage in private practice. The Attorney-General of the United States is the chief law officer of the Federal government and a member of the President's cabinet. His duties are prescribed by statute, and his annual salary is $8000. Each State has a similar officer, as has each crown colony of Great Britain. *Attorney-General to the Prince of Wales* is the officer in whose name the Prince, as Duke of Cornwall, may sue and be sued in matters connected with that duchy.

**Attorney, Letter or Power of.** An instrument authorizing a person to act as the agent or attorney of the person granting it. A general power authorizes the agent to act generally for the principal. A special power limits the agency to particular things. A power of attorney may be by parol or under seal. The attorney cannot execute a sealed instrument that will bind his principal unless his own power is given under seal. Grants of this nature are very strictly construed. Authority given to one person cannot be delegated by him to another, unless expressly set forth in the original grant. The death of the principal at once cancels a power of attorney. All conditions in the power must be strictly observed to render the attorney's action legal. Consult the works referred to under the title AGENT.

**Attorney, Warrant of.** The written authority to an attorney at law to appear in a litigation for the maker. The production of such authority is rarely required by the courts. The term is applied also to the written authority given by a debtor to an attorney named by the creditor to confess judgment for the debt. It is often attached to and made part of a promissory note. In some States it renders the note non-negotiable, but in most jurisdictions it does not affect the negotiability of the note.

**ATTORNMENT,** ăt-tûrn'ment (for derivation, see ATTORNEY). The formal recognition, by a tenant, of the grantee of the freehold as his landlord. This doctrine, which has played an important rôle in the modern law of landlord and tenant, had its almost forgotten origin in the feudal system of land tenure. The intimate character of the relationship of lord and freehold tenant in this system required not only that the lord should choose his own tenant, but the correlative right of the tenant to choose his own lord. The tenant was the first to gain the right to alienate his freehold, and thus to impose upon his lord a tenant, not of the latter's choice (Statute *Quia Emptores*, 18 Edw. I, 1290 A.D.), but the right of the tenant to refuse his assent to the conveyance of the landlord's estate in the premises, and thus to render his grant ineffectual and incomplete, not only continued 400 years longer, but was extended by analogy to the common, non-feudal relations of landlord and tenant. Accordingly, it was the law of England and of the English colonies in America until the Statute of 4 Anne, chap. 16, 1705 A.D., that an owner of lands subject to a lease for life or years could not make an effectual grant of his reversion (q.v.), or estate as landlord, without the assent of the tenant in possession. This assent might be manifested by words, by agreement in writing, by the payment of rent or of a nominal sum, and was called an attornment, or turning to, submission to, the new landlord. Without such attornment the grantee of the reversion was not entitled to the rents and services of the tenancy, nor could he enforce against the tenant any covenant or condition on which the lands were held. The statute above referred to, however, dispensed with the necessity of attornment in all ordinary cases of conveyance of his estate by the landlord, making such conveyance good and effectual from its date, the tenant becoming *ipso facto* tenant of the grantee upon the terms of the existing lease, and such is now the law everywhere in the United States.

Under the old law it was possible for a tenant, by attorning to a stranger, virtually to dispossess, or disseize, his landlord, and thus put him to an action to recover possession of his lands. This extraordinary and wrongful effect of an attornment was also done away with by the Statute of Anne (sec. 10), and the tenant estopped to deny his landlord's title (see ESTOPPEL), unless the attornment be made with the landlord's consent, or in consequence of a judgment or decree of a court, or to a mortgagee after the mortgage has been forfeited. The exceptions are still a part of the law, and, under them, the doctrine of attornment is an important part of the modern law of landlord and tenant. It should be added that, though a tenant is, in the ordinary case of an alienation of the freehold by his landlord, no longer protected by the necessity of making an attornment, he does not become liable on the obligations of his lease to the new landlord until notified of the transfer. Consult: Kent, *Commentaries on American Law* (Boston, 1896); Taylor, *Treatise on the American Law of Landlord and Tenant* (9th ed., Boston, 1904); Tiffany, *The Law of Landlord and Tenant* (St. Paul, 1910). See LANDLORD AND TENANT.

**ATTRAC'TION** (Lat. *attractio*, a drawing

together, from *ad*, to + *trahere*, to draw). The phenomenon that takes place when two or more bodies belonging to the same system, but separated from contact with one another, tend to approach each other as the result of a condition of stress. Attraction is seen in the case of celestial bodies, the earth and a falling body, electrified bodies, and a magnet and a piece of iron or steel. Gravitational attraction varies as the product of the masses, and inversely as the distance separating them, or, in other words, follows the "Law of Inverse Squares." Attraction is the same in nature as repulsion, but is opposite in direction, the former being considered to be a negative force in that it tends to diminish the distance between the bodies, while the latter is considered positive in that it tends to make this distance greater. It plays an important part in the discussion of many physical phenomena and will be found treated at considerable length in GRAVITATION; ELECTRICITY; MAGNETISM.

**AT'TRIBUTE** (Lat. *attributum*, from *ad*, to + *tribuere*, to ascribe). 1. In painting and sculpture, a symbol associated with a figure to describe and emphasize its meaning in a religious, mythological, or allegorical sense. No period of art has been without attributes, but they have been most important at times when art has been less able to give character to the figures themselves, so that they can be recognized without the help of the accompanying attributes. The brush is the attribute of the painter; the stylus, of the scribe; the crown, of royalty; wings, of genii and angels. These are class attributes. In mythology the cow is the attribute of Hathor (Egypt); the tiger, of Ishtar (Assyria); the club, of Hercules; the trident, of Poseidon or Neptune (Græco-Roman). In Christian art the gridiron is the attribute of St. Lawrence; the lamb, of St. Agnes; the keys, of St. Peter. Attributes differ from emblems (q.v.) and symbols in having no value apart from their figures. 2. In logic, a mark or quality considered as giving character to an object of thought. (See LOGIC.) It is a term much used in Christian theology to denote some characteristic of the Divine nature, such as omniscience.

**ATTRI'TION.** See CONTRITION.

**ATTU,** ät'tōō, or **ATTOO.** The westernmost island of the Aleutian group and of the United States land areas in America, lat. 52° 58′ N., long. 172° 66′ E. (Map: Arctic Regions, A 4). Upon it is a small village, with less than 100 native families. Highest elevation, 3084 feet. Excavations have thrown much light on the material culture of the early Aleuts.

**AT'TUCKS,** CRISPUS. The first man killed in the "Boston Massacre" (q.v.), March 5, 1770. He was a half-breed Indian, or a mulatto, of Framingham, Mass., born about 1720. By some he is said to have been a quiet on-looker; by others, a ringleader in the disturbance. A monument to him stands on Boston Common. Consult the *American Historical Record* for 1872, and Kidder, *History of the Boston Massacre* (Albany, 1870).

**ATTYS.** See ATTIS.

**AT'WATER,** WILBUR OLIN (1844–1907). An American chemist and pioneer in agricultural experiment station work. He was born at Johnsburg, N. Y., and graduated at Wesleyan University, Middletown, Conn., in 1865, received his doctor's degree from Yale University in 1869, and afterward studied physiological and agricultural chemistry at the universities of Leipzig and Berlin. He was professor of chemistry at Tennessee University, at Maine State College, and at Wesleyan University. He organized and was the first director of the pioneer state agricultural experiment station in this country at Wesleyan University in 1875, and was likewise the first director of the Office of Experiment Stations of the United States Department of Agriculture, upon its organization in 1888. In the latter capacity he largely established the policies of the office and its lines of future work, including the founding of *Experiment Station Record* and the first farmers' bulletin. From 1887 to 1902 he was also director of the Storrs (Connecticut) Experiment Station, during which time important studies were made in chemistry and other lines related to agriculture and in human nutrition. In 1894 he became chief of the nutrition investigations of the United States Department of Agriculture, and coöperated with many of the experiment stations and the Carnegie Institution in comprehensive investigations of human nutrition. With Rosa, Benedict, and others he developed special forms of bomb and respiration calorimeters with which exact and fundamental studies of the metabolic changes in the human body were conducted. He wrote a large number of articles on physiological and agricultural chemistry, notably *An Experimental Inquiry Regarding the Nutritive Value of Alcohol*, in vol. viii of the National Academy of Science publications; and the following bulletins of the Office of Experiment Stations of the United States Department of Agriculture: Nos. 21, *Methods and Results of Investigations on the Chemistry and Economy of Food;* 28 (with Woods), *The Chemical Composition of American Food Materials;* 45 (with Langworthy), *A Digest of Metabolism Investigations;* and 44, 63, 69, 109, and 136 (with Benedict et al.), *Experiments in the Metabolism of Matter and Energy in the Human Body.*

**AT'WILL,** EDWARD ROBERT (1840–1911). An American clergyman. He was born at Red Hook, N. Y.; graduated at Columbia College in 1862 and at the General Theological Seminary, in New York City, in 1864. He entered the ministry of the Protestant Episcopal church, and after service in New York, Vermont, and Ohio, became Bishop of West Missouri in 1890.

**AT'WOOD,** CHARLES B. (1849–95). An American architect, noted principally as the designer of W. H. Vanderbilt's house on Fifth Avenue, New York, and as Chief of Design of the World's Fair in Chicago, where the Art Building (now the Columbian Museum) and Peristyle Court were his personal work.

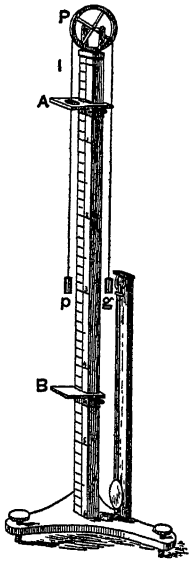
**ATWOOD,** GEORGE (1746–1807). An English mathematician and physicist. He was born in London, and graduated at Trinity College, Cambridge, with high honors in 1769. Subsequently he was appointed fellow and tutor. He received the degree of M.A. in 1772 and was elected a member of the Royal Society in 1776. Through the influence of William Pitt he was appointed to a position in the customs service, where he performed a number of important mathematical calculations connected with the revenue. The apparatus known as Atwood's machine (q.v.) was described in his *Treatise on the Rectilinear Motion and Rotation of Bodies, with a Description of Original Experiments Relative to the Subject* (1784). He also wrote *A Descrip-*

*tion of the Experiments Intended to Illustrate a Course of Lectures on the Principles of Natural Philosophy* (1776), and *An Analysis of a Course of Lectures on the Principles of Natural Philosophy* (1784), as well as a number of papers on mathematical subjects, published for the most part in the *Philosophical Transactions*. For one of these he received the Copley Medal in 1796.

**ATWOOD,** ISAAC MORGAN (1837–1917). A Universalist clergyman, born at Pembroke, N. Y. He became a Universalist minister in 1859 and was the president of the Canton (N. Y.) Theological School and professor of theology from 1879 to 1899. In 1898 he became general superintendent of the denomination in the United States and Canada. His publications embrace: *A Glance at the Religious Progress of the United States* (1874); *Walks about Zion* (1880); *Revelation* (1893); *Balance Sheet of Biblical Criticism* (1896). He edited *The Latest Word of Universalism* (1879); *A System of Christian Doctrines* (1900).

**ATWOOD,** JULIUS WALTER (1857—). An American clergyman, born at Salisbury, Vt. He was educated at Middlebury College, General Theological Seminary, and the Episcopal Theological School at Cambridge. He was ordained deacon in 1882 and priest in 1883 of the Protestant Episcopal church. He was rector at Ipswich, Mass.; Providence, R. I.; Columbus, Ohio; and Phœnix, Ariz. From 1907 to 1911 he was Archdeacon of the Diocese of Arizona, and in the latter year he was consecrated Bishop of Arizona. In addition to sermons and addresses, he is author of *The Spiritual Influence of John Greenleaf Whittier* (1893).

**ATWOOD'S MACHINE.** An instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity, invented by George Atwood (q.v.). It is known that a body falling freely passes through 16 feet in the first second, 64 feet in the first two seconds, 144 feet in the first three seconds, and so on. Now, as these spaces are so large, it would require a machine of impracticable size to illustrate the relations just mentioned. The object of Atwood's machine is to reduce the scale on which gravity acts without in any way altering its essential features as an accelerating force. The machine, which may be modified in its actual construction, consists essentially of a pulley, *P* (see the cut), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, *p* and *g*, at its extremities. The pulley rests on a graduated wooden pillar, which is placed in a vertical position by leveling screws. Two stages, *A* and *B*, slide along the pillar and can be fixed at any part of it by means of clamps. One of these stages, *A*, has a circular hole cut in it, so as to allow the cylinder, *p*, to pass freely through it; the other is unbroken and intercepts the passage of the weight. A pendulum, chronograph, or other device is used with the machine to measure time. The weight of the cylinders, *p* and *g*, being equal, they have no tendency to rise or fall, but are reduced, as it were, to masses without weight. When a bar is placed on *p*, the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be considerably slower than that of the bar falling freely. Suppose, for instance, that *p* and *g* are each 7½ ounces in weight, and that the bar is 1 ounce, the force acting on the system—leaving the friction and inertia of the pulley out of account—would be 1-16 of gravity, or the whole would move only 1 foot in the first second, instead of 16. If the bar be left free to fall, its weight or moving force would bring its own mass through 16 feet the first second; but when placed on *p*, this force is exerted not only on the mass of the bar, but on that of *p* and *g*, which is 15 times greater, so that it has altogether 16 times more matter in the second case to move than in the first, and must, in consequence, move it 16 times more slowly. By a proper adjustment of weights the rate of motion may be made as small as we please, or we can reduce the accelerating force to any fraction of gravity. Suppose the weights to be so adjusted that under the moving force of the bar or circular weight the whole moves through 1 inch in the first second, we may make the following simple experiments: *Experiment I.*—Place the bar on *p*, and put the weight in such a position that the lower surface of the bar shall be horizontally in the same plane as the 0 point of the scale, and fix the stage *A* at 1 inch. When allowed to descend, the bar will accompany the weight, *p*, during 1 second and for 1 inch, when it will be arrested by the stage *A*, after which *p* and *g* will continue to move from the momentum they have acquired in passing through the first inch. Their velocity will now be found to be quite uniform, being 2 inches per second, illustrating the principle that a falling body acquires, at the end of the first second, a velocity per second equal to twice the space it has fallen through. *Experiment II.*—Take, instead of the bar, the circular weight, place the bottom of *p* in a line with the 0 point, and put the stage *B* at 64 inches. Since the weight accompanies *p* throughout its fall, we have in this experiment the same conditions as in the ordinary fall of a body. When released, the bottom of the cylinder, *p*, reaches 1 inch in 1 second, 4 inches in 2 seconds, 9 inches in 3 seconds, 16 inches in 4 seconds, 25 inches in 5 seconds, 49 inches in 7 seconds, and 64 inches and the stage in 8 seconds—showing that the spaces described are as the squares of the times. *Experiment III.*—If the bar be placed as in Experiment I, and the stage *A* be fixed at 4 inches, the bar will accompany the weight, *p*, during 2 seconds, and the velocity acquired in that time by *p* and *g* will be 4 inches per second, or twice what it was before. In the same manner, if the stage *A* be placed at 9, 16, 25, etc. inches, the velocities acquired in falling through these spaces would be respectively 6, 8, 10, etc. inches —2 inches of velocity being acquired in each second of the fall. From this it is manifest that the force under which bodies fall is a uniformly accelerating force, i.e., adds equal increments of velocity in equal times. By means of the bar and the stage *A*, we are thus enabled to



remove the accelerating force from the falling body at any point of its fall and then determine the velocity it has acquired.

Atwood's machine will be found described and explained in almost any treatise on physics, and complete directions for performing the experiments are given in Glazebrook and Shaw's *Practical Physics* (New York, 1893). See GRAVITATION.

**A'TYS.** See ATTIS.

**AUBANEL,** ō'bȧ'nĕl', THÉODORE (1829–86). A French author. He was the son of a printer of Avignon and, while following his father's profession, sought, throughout a period of 30 years, to bring about a regeneration of the language and literature of the troubadours of Provence, to which end he long collaborated with Mistral, Roumanille, and other *félibres*. (See FÉLIBRIGE.) He was called by some of his more enthusiastic admirers, "the Petrarch of France." He is best known by his poems *La Miòugrano entreduberto* (Paris, 1860). A drama of his in five acts, entitled *Lou pan dòu pecat*, was performed with great success at Montpellier in 1878. See PROVENÇAL LANGUAGE; PROVENÇAL LITERATURE.

**AUBE,** ōb. A central department of France, occupying the southern part of the old province of Champagne, and a small portion of Burgundy (Map: France, N., K 4). The eastern part belongs to the basin of the Aube; the western to the basin of the Seine. Area, 2327 square miles. Pop., 1896, 251,435; 1906, 243,670; 1911, 240,755. The climate is mild, moist, and changeable, but on the whole healthful. A great portion of the area is arable land, producing grain, hemp, hay, vegetables, and wine. There are deposits of limestone, marl, and potters' clay. Cotton weaving is the leading manufacture, of which industry the centre is Troyes, the capital.

**AUBE.** A right tributary of the upper Seine (Map: France, N., J 4). It rises on the plateau of Langres, in the department of Haute-Marne, and falls into the Seine near Pont-sur-Seine, after a course of 154 miles, for a small part of which it is navigable. It is used for the transportation of coal, lumber, and grain.

**AUBE,** HYACINTHE LAURENT THÉOPHILE (1826–90). A French admiral. He was born at Toulon; entered the navy in 1840; served with distinction in the colonies, and was in charge of some coast defenses during the Franco-German War. In 1879 he was appointed Governor of Martinique, and on his return to France in 1881 was made a rear-admiral. His appointment to the ministry of the navy and to the rank of vice-admiral followed in 1886. Aube was a strong advocate of the torpedo system. He was a voluminous writer, some of his more important works being: *De la marine française* (1873); *La guerre navale et les ports militaires de la France* (1879); *Italie et Levant* (1884); *Marine et colonies* (1885). Most of his writings have been collected under the titles *Entre deux campagnes* and *A terre et à bord.*

**AUBÉ,** JEAN PAUL (1837–1916). A French sculptor. He was born at Longwy (Meurthe-et-Moselle), and studied with Duret and the elder Dauban at the Ecole des Beaux-Arts. Among the numerous statues and other works executed by him are the following: "Dante Alighieri" (1880), at Paris; "Général Joubert à Rivoli," at Bourges; "Gambetta," in the Place du Carrousel, Paris; "Bailly," a bronze statue in the Luxembourg Garden; a portrait statue, and "France and Russia," a decoration—both in the Luxembourg.

**AUBENAS,** ōb'nȧs'. A town of France in the department of Ardeche, on an eminence near the river of the same name, 24 miles southwest of Privas (Map: France, S., J 4). In the vicinity are several extinct volcanoes. The town has a fifteenth-century church, a chateau of the thirteenth and sixteenth centuries, and a flourishing trade in silk. Pop., 1901, 8362; 1911, 7206.

**AUBER,** ō'bâr', DANIEL FRANÇOIS ESPRIT (1782–1871). A famous French operatic composer. He was born at Caen, Normandy, and died in Paris. His father, an amateur painter and violinist of some note, was a dealer in prints who sent him to England to learn the trade. But his love for music soon asserted itself, and in 1804 he returned to Paris, where his musical compositions soon attracted attention. His concertos for the 'cello and violin were performed with great success by Lamare and Mazas respectively. In 1811 a resetting of an old libretto, *Julie*, to the accompaniment of six stringed instruments, won the admiration of Cherubini at a performance by amateurs. Cherubini then gave Auber instruction in composition, and part of a mass written about this time is preserved as the prayer in *La muette de Portici*. Auber's one-act opera, *Le séjour militaire* (1813), was a dismal failure, and the discouraged composer did not again tempt fortune until his father's death left him without means of livelihood. His next work, *Le testament et les billet-doux* (1819), was not successful, but *La bergère châtelaine* (1820), a comic opera in the Rossinian style, was enthusiastically received, and the composer's fame increased with subsequent works, which followed in rapid succession (over 40 in all) until his very death. *Le maçon* was produced at the Paris Opéra Comique (1825) and is one of the stock pieces of the German opera houses today. *La muette de Portici* (or *Masaniello*, also *Fénella*), 1828, is his most serious opera. The author of sparkling music of the light order here sounded broader and deeper emotions and produced strongly dramatic contrasts. *Fra Diavolo* was performed in 1830 and has remained his most popular work. Other operas that maintained their popularity for almost half a century are: *Le philtre* (1831); *Le cheval de bronze* (1835); *Le domino noir* (1837); *Le lac des fées* (1839); *Les diamants de la couronne* (1841). Although the last-mentioned work was followed by 14 other operas, none of these attained real success. On the contrary, they show a gradual and steady decline of the composer's powers. He was chosen to succeed Gossec at the Academy in 1829, became director of the Conservatoire in 1842, and was appointed court chapel master by Napoleon III in 1857. Auber is deemed the founder of what the French call *grand opéra;* Rossini's *Guillaume Tell* (1829), Halévy's *La juive* (1835), and Meyerbeer's *Robert le diable* (1831) and *Les Hugenots* (1836) show the influence spread by *La muette de Portici*. The formal structure, the musical individualization of conflicting ethnographical or religious elements, the stirring mass-effects, the local color in the orchestra brought to a high state of perfection, and the pageantry of these works, are all derived from Auber. In *opéra comique*, too, Auber occupies a prominent place. For external polish, captivating melody, brilliant orchestration, dash, and Parisian chic, his music re-

mains unexcelled. Consult A. Kohut, *Auber* (Leipzig, 1895), and C. Malherbe, *Auber, biographie critique* (Paris, 1911).

**AUBERGE ROUGE, L'**, lō'bârzh'rōōzh ('The Red Inn'). A striking psychical romance by Balzac (1831), based on the psychic suggestion of a murder, for which the suggester is executed while the actual murderer enjoys the fruits of the crime. The story involves the questions of comparative guilt and innocence, atonement, and the proper use of the wealth gained by the wrong-doing.

**AUBERLEN,** ou'bĕr-len, KARL AUGUST (1824–64). A German theologian. He was born at Fellbach, near Stuttgart, studied at Tübingen, and became professor of theology at Basel in 1851. As a youth he was influenced by Baur, but later he adopted the conservative views of Beck and Rothe. He is still remembered by his *Prophecies of Daniel and the Revelation of St. John, viewed in their Mutual Relation; with an Exposition of the Principal Passages* (Basel, 1854; 2d ed., 1857; Eng. trans., Edinburgh, 1856); *The Divine Revelation, An Essay in Defense of the Faith* (2 vols., Basel, 1862–64; Eng. trans. of vol. i, 1867); "The Old Testament Dispensation and the Heathen World"; "The Resurrection and Ascension of Jesus Christ" (lectures) in the volume entitled in English *Foundations of Our Faith* (1862; Eng. trans., 1863; 2d ed., 1868), and his commentary on Thessalonians in Lange (Bielefeld, 1864; Eng. trans., 1868). The English translation of the *Divine Revelation* contains a brief memoir.

**AUBERT,** ō'bâr', JEAN LOUIS (1731–1814). A French author, born at Paris. He first attracted attention by his *Fables*, which were published in the *Mercure de France* and favorably regarded by Voltaire. He was professor of French literature at the Collège Royal from 1773 to 1784, and from 1774 to 1786 editor of the *Gazette de France*. He was one of the leading journalists of his time. His works were collected as *Fables et œuvres diverses* (1774).

**AUBERT,** LOUIS FRANÇOIS MARIE (1877—). A French composer. He was born Feb. 15, 1877, at Parame. His musical talent manifested itself very early and was carefully cultivated by his artistic parents. At the age of nine he entered the Conservatory at Paris, where he studied the piano under Diemer and Fauré, and composition under Lavignac. His musical style is strongly influenced by Debussy. He wrote several collections of songs, a Fantaisie for piano and orchestra (1901), and an opera, *La Forêt Bleue* (1906), which was produced in America by the Boston Opera Company (1913).

**AUBERVILLERS,** ō'bâr'vē'yâ'. One of the northern suburbs of Paris (Map: Paris and vicinity). There are manufactures of chemical products, glass, rubber, perfumes, and beer. In 1905 was erected here the large Hospital Claude-Bernard, for contagious diseases. Pop., 1896, 27,000; 1906, 34,000; 1911, 37,558.

**AUBIGNAC,** ō'bē'nyȧk', FRANÇOIS, ABBÉ D' (1604–76). A French dramatist and critic, born in Paris. His real name was Hédelin, but he is better known as the Abbé d'Aubignac, from the abbey conferred on him by Richelieu. He was chosen by Richelieu to be the tutor of his nephew, but is described as having been excessively pedantic and conceited. Chief among his compositions are a prose tragedy, called *Zénobie*, and a tedious work on the *Pratique du théâtre*, based on Aristotle. He was one of the first to raise the modern question in regard to the authorship of the Homeric poems.

**AUBIGNÉ,** ō'bē'nyā', THÉODORE AGRIPPA D' (1552–1630). A French Huguenot soldier, militant poet, historian, and statesman. He was born near the town of Pons in Saintonge. As a child he was a brilliant classical scholar. He early embraced the Huguenot cause, was captured, condemned to death, escaped, and in 1563 was present at the siege of Orleans, where his father was killed. His guardian sent him to Geneva to escape persecution. He studied under Beza, but in 1567 enlisted under Condé, and later served Henry of Navarre as soldier and sometimes over-candid counselor. After Henry's assassination Aubigné fell into disfavor and in 1620 sought refuge at Geneva, whence he superintended the fortifications of Bern and Basel. In spite of his storm-tossed life, he had found time to produce much of value to literature and to contemporary history. His *Histoire universelle, 1550–1601*, published at Amsterdam (1616–20), was officially burned in France, as was also his autobiographical *Histoire secrète*, on its appearance in 1731. These are very valuable, but bitterly satirical, as is his controversial *Confession catholique du Sieur de Sancy* and *Les aventures du baron de Fœneste* (1617), one of the earliest realistic novels of the seventeenth century. His greatest work, begun while recovering from a wound (1577), is a group of satirical poems, *Les tragiques* (1616), which are sombre and unexcelled descriptions of the horrors of religious warfare. They are divided into "The Miseries," "The Princes," "The Gilded Chamber" (i.e., the courts), "The Fires," "The Words," "The Vengeances," and "The Judgment," where the Huguenot, oppressed on earth, cites his persecutor before the bar of God at the Resurrection. The 9000 verses are a strange mingling of beauty and chaos, often reckless, sometimes obscure, but with passages of a fierce inspiration, a brilliant imaginative enthusiasm, that have earned immortality, both for their own sake, as the noble utterance of an offended conscience, and as a true expression of the faith, courage, restless searching of spirit, presumption, and pride, that characterized the movement in which he bore a conspicuous part. He is a striking figure, writing with the style of Rabelais and the spirit of Henri Estienne (see STEPHANUS) in the days of Malherbe and Richelieu, without elegance, clearness, precision, or composition, but with the energy born of the Renaissance and the Reformation. An almost universal scholar in the learning of his time, Aubigné was never a pedant. For that he was too sincere, intense, earnest; and, even in bitterness, he strove to be just. Thus his History presents the mind of his epoch, even when it distorts the facts. His complete *Works* have been edited by Réaume and Caussade, 6 vols. (1873–93), the *Tragiques* by Lalanne (1857) and Reade (1872); *Histoire universelle*, by Ruble (1886–97). Consult: Morillot, *Discours sur la vie et les œuvres d'Agrippa d'Aubigné* (Paris, 1885); Salis, *Agrippa d'Aubigné* (Heidelberg, 1885), and a *Life* in French by G. Guizot, *Agrippa d'Aubigné* (Paris, 1890); also Macdowell, "Agrippa d'Aubigné" in *Henry of Guise and other Portraits* (New York, 1898), and Rocherblave, *Agrippa d'Aubigné* (Paris, 1910); id., *La vie d'un Héros* (ib., 1913).

**AUBIGNÉ, MERLE D'.** See MERLE D'AUBIGNÉ.

**AUBIN**, ō'băn'. A town of France in the department of Aveyron, on the Orleans Railway (Map: France S., G 4). There are extensive coal and iron mines in the vicinity, and the town contains an old church, dating from the twelfth century, and a ruined castle. Pop., 1896 (of commune), 9781; 1901, 9973; 1906, 9986; 1911, 9574.

**AUBREY**, ą'brĭ, JOHN (1626–97). An English antiquary. He was a diligent collector of old documents and left some valuable works of his own. He published only one book, called *Miscellanies* (1696; 5th ed., 1890), but several of his works were afterward edited and published by others. Among these were *Natural History and Antiquities of Surrey* (1719) and *Letters written by Eminent Persons of the Seventeenth and Eighteenth Centuries* (1813). The latter gives much biographical matter concerning English poets. Consult his biography, by J. Britton (London, 1845), and the essay of Professor Masson in the British *Quarterly Review*, vol. xxiv (London, 1857).

**AUBRIOT**, ō'brē'ō', HUGUES (d. 1382). A mayor of Paris. He was born at Dijon; was appointed Treasurer under Charles V and afterward became mayor and Governor of Paris (1364), in which capacity he organized several of the greatest public works of the city. He laid the corner stone of the Bastile, built Le Petit Châtelet, the Pont Saint-Michel, and several quays along the Seine, and completed the fortifications begun by Etienne Marcel. After the death of Charles V he was accused of heresy and sentenced to perpetual captivity in the Bastile, but was liberated by the Mailletons soon afterward. His statue adorns the façade of the Hôtel de Ville in Paris. Consult Eugène Déprez, *Hugo Aubriot, Præpositus Parisiensis et Urfanus Prætor, 1367–81* (Paris, 1902).

**AUBRY**, ō'brē', CHARLES MARIE BARBE ANTOINE (1803–83). A French jurist, born at Zabern, Alsace. He was assistant judge of the tribunal at Strassburg in 1870, and councilor of the Court of Cassation in Paris from 1872 to 1878. He became a commander of the Legion of Honor in 1878. He was one of the most highly esteemed French writers on jurisprudence of his century and was widely known also for his articles on legislation and a translation of Goethe's *Faust*. His principal work is the *Cours de droit civil français, d'après la méthode de Zachariæ*, 8 vols. (Paris, 1869–76).

**AUBRY DE MONTDIDIER**, ō'brē' de mon'dē'dyā'. A French knight who lived during the reign of Charles V, and, according to tradition, was assassinated in the forest of Bondy by his comrade, Richard de Macaire, in 1371. The latter was suspected of the crime because the dog belonging to the deceased Aubry invariably displayed toward him the most unappeasable enmity. Macaire was therefore required by the King to fight with the animal in a judicial combat, which was fatal to the murderer. This tale was afterward, under the titles of *Aubry's Dog, The Wood of Bondy, The Dog of Montargis*, frequently acted, the dog always gaining the greatest share of applause. It was called *The Dog of Montargis*, because Charles VIII had the fight between the dog and Macaire depicted over a mantel in his chateau of Montargis. As late as 1816 a melodrama based on the legend found great favor on the European stage. After being performed with success at Vienna and Berlin, it was to be played at the Weimar theatre of which Goethe was the manager; but the poet resigned his office before the dog made his début. Consult Guessard, *Macaire* (Paris, 1866).

**AUBURN**, ą'bûrn. A town in Lee Co., Ala., 59 miles east by north of Montgomery, on the Western Railway of Alabama (Map: Alabama, D 3). It is the seat of the Alabama Polytechnic Institute, opened in 1872, and has a Carnegie library. Pop., 1890, 1440; 1900, 1447; 1910, 1408.

**AUBURN**. A city, and the county-seat of Placer Co., Cal., about 36 miles northeast of Sacramento, on the Southern Pacific Railroad (Map: California, D 4). It contains a library, and a county high school. Gold, granite, potters' clay, and limestone are found in the adjacent region; mining, fruit growing, and general agriculture are the leading industries. Auburn was first settled in 1848. Pop., 1900, 2050; 1910, 2376.

**AUBURN**. A city, and the county-seat of De Kalb Co., Ind., 23 miles by rail north by east of Fort Wayne; on Cedar Creek, and on the Vandalia, the Lake Shore and Michigan Southern, and the Baltimore and Ohio railroads, Fort Wayne and Northwestern Railway Company (Map: Indiana, D 1). It carries on a trade in grain, live stock, hay, onions, etc.; and manufactures carriages and wagons, automobiles, cycle cars, brass, ice, clothing, handles, buggy-bodies, excelsior, lumber, gas engines, windmills, etc. The county buildings and the Eckhart public library, the Y. M. C. A. building, and City Hall are the principal features of interest. There are municipal water works and electric light plant. Pop., 1890, 2415; 1900, 3396; 1910, 3919.

**AUBURN**. A city, and the county-seat of Androscoggin Co., Maine, 34 miles north of Portland, on the Maine Central, and Grand Trunk railroads (Map: Maine, B 4). It has extensive manufactures of lumber, boots and shoes, boxes, and cotton goods, abundant water power being supplied by the Androscoggin and Little Androscoggin rivers. The city has a public library and owns and operates its water works. In the vicinity are many points of interest, notably Lewiston Falls, Lake Auburn, and Poland Springs. Auburn was settled in 1786 and first incorporated in 1842. The charter of 1869 provides for a mayor, elected annually, and a bicameral council, which controls all important appointive offices. Pop., 1890, 11,250; 1900, 12,951; 1910, 15,064; 1920, 16,985.

**AUBURN**. A city, and the county-seat of Nemaha Co., Neb., 74 miles south of Omaha, on the Chicago, Burlington, and Quincy and the Missouri Pacific railroads, and on the Nemaha River (Map: Nebraska, J 4). The city is in a fertile agricultural region and has fruit and corn canning industries. The water works and city-lighting system are owned by the municipality. Pop., 1900, 2664; 1910, 2729.

**AUBURN**. A city, and the county-seat of Cayuga Co., N. Y., 26 miles southwest of Syracuse, on the New York Central, the Lehigh Valley, and the New York, Auburn, and Lansing railroads; and on the outlet of Owasco Lake (Map: New York, D 5). It has good water power and extensive manufactures of agricultural implements, woolen goods, carpets, iron, shoes, engines, pianos, rope, etc. Auburn is the seat of the Auburn Theological Seminary (Presbyterian) (q.v.), incorporated in 1820; of a State prison, a large stone structure with provision for 1200 convicts, and a prison for

women. It also contains a women's industrial and educational building, the home and a fine statue of William H. Seward, a library, an armory, and a county courthouse. The city is governed by a mayor, elected biennially, and a city council. The mayor has the power of appointing heads of important departments—street, charities, fire, police, and health; the council has elective power in minor offices. The annual expenditures of the city are about $550,000, the main items being $38,000 for the police department, $52,000 for the fire department, and $154,000 for schools. The water works are owned and operated by the municipality. Auburn was founded by Capt. John L. Hardenbergh in 1792, and called Hardenbergh's Corners until 1805, when it was made the county-seat and received its present name. In 1815 it was incorporated as a village and was chartered as a city in 1848. Auburn is a popular summer resort on account of the many lakes in its vicinity. Pop., 1900, 30,345; 1910, 34,668; 1920, 36,192. Consult H. Hall, *The History of Auburn* (Auburn, 1869), and J. H. Monroe, *History of Auburn* (1913).

**AUBURN.** The name of the place celebrated in Goldsmith's *Deserted Village* and commonly identified with Lissoy, County Westmeath, Ireland. Here the poet's father had a parish, and here the poet spent his boyhood.

**AUBURN THE'OLOG'ICAL SEM'INARY.** An American Presbyterian seminary at Auburn, N. Y., founded in 1818 by the Synod of Geneva and incorporated in 1820. In 1913 the endowment was $790,000. The productive funds amount to $776,000 and the annual income to nearly $76,000. The library contains 34,720 volumes and 13,000 pamphlets. The course is three years and is designed primarily for college graduates. In 1913 the faculty numbered 11, and the students 57. President, Rev. George B. Stewart, D.D., LL.D.

**AUBUSSON,** ō'bụ'sōN'. A town, capital of an arrondisement of the same name in the department of Creuse, France (Map: France, S., G 3). This town, which is picturesquely situated on the Creuse River 20 miles southeast of Gueret, has long been noted for its manufacture of carpets, an industry which employs about 2000 hands. Pop., 1901, 6949; 1911, 7211.

**AUBUSSON,** PIERRE D' (1423–1503). Grand Master of the Order of St. John of Jerusalem. He was born of a noble French family. At the age of 12 or 13 he distinguished himself, under Albert, Duke of Austria, in fighting against the Turks in Hungary. In 1444 he took part in the campaign of the Armagnacs against the Swiss. Disgusted at the disgraceful failure of this expedition, due to the heroism of the Confederates at "the German Thermopylæ," he went to Rhodes and entered the Order of St. John. He distinguished himself in fighting pirates and on diplomatic missions. In 1476 he was elected Grand Master. In 1480 he defended Rhodes successfully against Mohammed II. He was a very able diplomat, and enriched and strengthened his order. In 1489 he was made a cardinal. He has been called "the shield of the Church," because his great aim was to form a league of Christians against the infidels. In 1501 he seemed on the point of accomplishing his purpose and was appointed commander in chief of the forces to be furnished by the Pope, the Emperor of Spain, and the kings of Castile, Portugal, Hungary, and France. But the alliance had no effect on account of the jealousies of the participants. Aubusson died in 1503. Consult Streck, *Pierre d'Aubusson* (Chemnitz, 1872).

**AUCASSIN ET NICOLETTE,** ō'kȧ'săN' ā nē'kō'lĕt'. A naive romance in Old French, celebrating the love and adventures of the young couple whose names form the title. Even by the casual reader of the present day the story will be found to possess a singular charm. The author never forgets that he has a tale to tell, and the human interest always predominates. For its time, the narrative is remarkably direct, and its artlessness has all the virtue of consummate art.

**AUCH,** ōsh. The capital of the department of Gers, in the south of France, situated on a hill near the river Gers, 42 miles west of Toulouse (Map: France, S., E 5). Auch is the seat of an archbishop, and possesses numerous statues, a library, and a museum of natural science. Its highest point is crowned by a cathedral famous for its stained-glass windows, begun by Charles VIII and completed by Louis XIV. It has an active trade in woolen and cotton goods, fruits, wine, and brandy. Pop., 1901, 13,939; 1906, 13,526; 1911, 13,638. In ancient times Auch was called Elimberrum; at a somewhat later period it took its name from the Ausci, whose chief town it was. In the eighth century it became the capital of Gascony.

**AUCHENIA,** ą-kē'nĭ-ä, **AUCHENIIDÆ,** ą-kĕn-ī'ĭ-dē. See LAMA.

**AUCHMUTY,** ŏk'mŭ-tĭ *or* ą'mụ-tĭ, SIR SAMUEL (1756–1822). A British general, son of Rev. Dr. Samuel Auchmuty. He graduated at King's (Columbia) College in 1775 and entered the British army the next year. He was in the battles of Brooklyn and White Plains and served in three campaigns. He served in India (from 1783 to 1796), in Egypt (1800), and in South America, where, in February, 1807, he took by assault the fort and city of Montevideo. He was advanced to the rank of major-general in 1808 and two years afterward was appointed commander-in-chief at Madras. The next year he reduced the Java Settlements. In 1813 he was made a lieutenant-general and was for a time commander in chief in Ireland, where he died.

**AUCHTERARDER,** ouK'tĕr-är'dēr. A village in Perthshire, Scotland, about 15 miles southwest of Perth (Map: Scotland, E 3). Cotton weaving, and the manufacture of woolen cloth and agricultural machines are the leading industries. Pop., 1901, 3159; 1911, 3175. The village was involved in the events leading to the disruption of the Church of Scotland and the formation of the Free Church, in 1843. Consult *The Auchterarder Case* (Edinburgh, 1842).

**AUCKLAND,** ąk'land. The northern provincial district of New Zealand (q.v.).

**AUCKLAND.** The chief town of the province of Auckland (area, 25,750 square miles; pop., 1911, 265,000) and the northern half of North Island, New Zealand, built on the shores of the beautiful Waitemata harbor, which opens out of the Hauraki Gulf, in lat. 36° 50′ S. and long. 174° 50′ E. (Map: New Zealand, N. I., B 3). Waitemata harbor affords splendid accommodation for shipping and has large docks. At dead low water, springtides, there is 36 feet. North Island at this point narrows to an isthmus 6 miles across, and on the western side there is a second harbor, the Manukau, whence

vessels trade up and down the west coast. From Waitemata harbor steamers leave regularly for Australia, South Africa, Great Britain, America, and the Pacific islands, and trade valued at $40,000,000 annually passes through this port. Auckland is 1315 miles from Sydney, 1650 from Melbourne, and 5440 from San Francisco, and it is the first and last Australasian port of call of the Oceanic mail liners from San Francisco to Sydney. The industries comprise shipbuilding, rope making, sugar refining, and trade in kauri gum and lumber. There are, besides, various agricultural, pastoral, and manufacturing industries. The imports include textiles, machinery, sugar, tea, and hardware. The city was the capital of New Zealand until 1865, when the more centrally situated Wellington was made the capital. There are many fine public and business buildings, a complete electric tram system, a university, which includes an excellent school of mines, and a very fine public library, which houses the magnificent Grey Library bequeathed to the city by the late Sir George Grey, K.C.B., and which includes many rare and some unique manuscripts. The climate is equable and the city is a favorite resort. Pop. (with suburbs), 1901, 67,226; 1906, 82,101; 1911, 102,676.

**AUCKLAND,** GEORGE EDEN, EARL OF (1784–1849). An English statesman, son of William Eden, Baron Auckland. He was educated at Christ Church, Oxford, and Lincoln's Inn. On the death of his elder brother in 1810, he succeeded to his brother's seat in the House of Commons. He was President of the Board of Trade from 1830 to 1834 and First Lord of the Admiralty in 1834 and 1835. In the latter year he was appointed Governor-General of India. But he was suspended in 1841 because of his Afghan war policy. In 1846 he became First Lord of the Admiralty, holding that cabinet office until his death. He was created Earl of Auckland in 1839.

**AUCKLAND,** WILLIAM EDEN, BARON (1744–1814). An English diplomat. He was educated at Oxford, and called to the bar in 1768. In 1772 he was appointed Under Secretary of State and afterward filled the posts of a lord of trade, a commissioner to treat with the insurgent Colonies of North America (1778), and Chief Secretary to the Lord Lieutenant of Ireland. Pitt sent him as a special commissioner to France to conclude a commercial treaty with that country (1786). Afterward he served as Plenipotentiary in Spain, Ambassador to Holland and Postmaster-General. In 1793 he was enrolled in the British peerage. He was the author of the *Principles of Penal Law* (1772), *Remarks on the Apparent Circumstances of the War* (1795), and several pamphlets. Consult *The Journals and Correspondence of William, Lord Auckland*, ed. by his son, the Bishop of Bath and Wells (4 vols., 1860–62).

**AUCKLAND ISLANDS.** A group of islands 200 miles south of New Zealand, lat. 50° 31′ S., long. 166° 19′ E. (Map: World, Western Hemisphere, P 2). It consists of the large island of Auckland (330 square miles) and a few smaller ones. They were discovered in 1806, and settled by the British in 1849, but are uninhabited at present. The New Zealand government maintains a station on Auckland Island for the relief of shipwrecked sailors.

**AUCTION** (Lat. *auctio*, increase, public sale by increased bids, from *augere*, increase). A public sale of property to the highest bidder. Ordinarily the property offered for sale is described, and the conditions in accordance with which it will be sold are announced, before bids are invited. Each bid is an offer, the auctioneer's acceptance of which is indicated by his knocking down the property to the bidder. Until the bid is thus accepted it may be withdrawn; but when thus accepted a contract is formed between the seller and the buyer, containing as a part of its terms all statements and conditions publicly made to the bidders on the seller's behalf. An auction should be fairly conducted on both sides. There should be no puffing, or bidding by dummies, in the interest of the seller, nor should he be allowed to bid unless he has stipulated for that right in the conditions of the auction, or the right is accorded to him by statute, or by an order of court having control of the sale. On the other hand, any concerted action by bidders for stifling the sale is illegal and may warrant the auctioneer in refusing to accept bids; it may even entitle the seller to avoid a sale.

The conduct of auctions is regulated, with a good deal of care, by modern statutes, in England and in many of our States. Not infrequently sham auctions are declared to be criminal offenses. As a rule, an auctioneer must have a license, either from the State or the municipal authorities. While engaged in bringing the property to a sale, he is the agent of the seller only. His power to bind the principal, and the principal's authority over him, as well as their respective duties to each other, are determined by the general principles of agency. As soon as the sale is made, he becomes an agent of the purchaser, as well as of the seller, for the purpose of making a memorandum of the sale which will satisfy the statute of frauds. This agency does not continue, however, beyond a reasonable time for the performance of that duty. The auctioneer has a lien on his principal's goods in his possession, and on the proceeds from their sale, to the extent of his commissions and expenses. Because of this interest in the property, he may sue in his own name for the purchase price, or for the wrongful conversion of the property by a third person. If he sells without disclosing his principal, he may be sued by the purchaser for any breach of the contract. Even though he names his principal, he will not always escape liability, though he follows strictly the principal's directions. If, for example, he in good faith sells property as that of the principal and turns the proceeds over to the latter, he will be liable for a conversion to a third party who owned and was entitled to possession of the property.

In a "Dutch auction" the property is offered at a high price, which the auctioneer lowers gradually, until a price is named which is accepted by the bidder. Here the offer is by the auctioneer and the acceptance by the bidder. An auction sale "by inch of candle" is when the biddings are to be kept open only while a stipulated length of candle burns. These two forms of auction are practically obsolete in England and the United States. Consult Bateman, *Treatise on the Law of Auctions* (1st Amer. ed., Boston, 1883; 7th Eng. ed., London, 1895): also the works referred to under AGENT.

**AUCTION BRIDGE.** Auction follows the parent game of Bridge (q.v.) in most particulars. The cutting, dealing, honor count, 30

points to a game, grand slam and little slam are the same as in Bridge, except that grand slam counts 100 points and little slam 50 points. If the dealer wins his first bid, the play is as in Bridge. The value of each trick over six in Auction is changed as follows: clubs are worth 6 points, diamonds 7 points, hearts 8 points, spades 9 points and no trumps 10 points. Regardless of the declaration, the deal passes regularly from left to right.

Auction differs from Bridge in awarding the declaration to the bidder who contracts to win the highest game score on the deal. If two players bid to win an equal number of points, the declaration goes to the one contracting to take the greater number of tricks, i.e., one offering to win 2 spades worth 18 points is counted overcalled by another bidding 3 clubs also worth 18 points, because it is obviously more difficult to take three odd tricks than to win two odd.

In counting, only the declarer can score game points. If he fails to make his contract, his adversaries score only in the honor column, which does not help them toward winning game or rubber. Successful adversaries take 50 points for each trick the declarer falls short of his contract, no matter what suit he has bid. Doubling raises the value of each undertrick to 100 points, redoubling increases it to 200 points, and so on. For keeping his contract, the declarer receives a bonus of 50 points in his honor score and 50 points for each trick over his contract. Winning the rubber adds 250 points to the honor column of the successful partners. Consult: Work, *Auction Developments* (1918), and Whitehead, *Auction Bridge* (1921); Elwell, *Principles, Rules, and Laws of Auction Bridge* (New York, 1910);

**AUCTIONEER.** See AUCTION.

**AUCUBA,** ą'kū-bȧ (Jap. *aoi, aoka,* green + *ba,* leaf). A genus of plants of the family Cornaceæ, containing 4 or 5 species, all in eastern Asia. The only cultivated species is *Aucuba japonica,* an evergreen shrub resembling a laurel. The leaves, however, are pale green, curiously mottled with yellow. It is dicœcious, produces its small purple flowers in summer, and ripens its bright scarlet berries in March. It is a native of China and Japan and is grown in Europe and America as an ornamental shrub. It is propagated by cuttings of half-ripened wood or by seed. A number of varieties, mostly with variegated leaves, are in cultivation. The plant is tolerant of smoke and dust.

**AUDÆUS,** AUDIUS (or, according to his native Syriac name, UDO). The founder of an anthropomorphic religious sect in Mesopotamia, called the Audians, which flourished during the fourth and fifth centuries. He commenced by accusing the regular clergy of worldliness, impure morals, etc., and is said to have opposed to their manner of life a strict asceticism, until his conduct seemed dangerous to the welfare of the Church, when he was excommunicated. His disciples, who were very numerous, now clung more closely to him, and he was elected their bishop. In 338 A.D. he was banished to Scythia, where he instituted a kind of rival church, and where he died about 370 A.D. He is said to have held that the language of the Old Testament—e.g., Gen. i. 27, literally interpreted—justifies the belief that God has a sensible form. From this belief the sect was sometimes called Anthropomorphites. See ANTHROPOMORPHISM.

**AUDE,** ōd. A southeastern maritime department of France (Map: France, S., G 5). It comprises a portion of the old province of Languedoc. Area, 2449 square miles. Pop., 1896, 310,513; 1906, 308,327; 1911, 300,537. The southern part of Aude is mountainous, but the greater portion of it belongs to the valley of the lower Aude and the canal of Languedoc. The climate is warm but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and about the coast—where salt and soda are procured—is extremely fertile, producing cereals, olives, fruits, and wines. Aude is rich in iron and coal, which it exports, and has mineral springs. The manufactures are numerous and varied. Capital, Carcassonne.

**AUDE** (anciently, Lat. *Atax*). A river in the south of France, rising in the East Pyrenees, in the department of Pyrénées-Orientales (Map: France, S., H 5). It flows north as far as Carcassonne, where it turns east and enters the Mediterranean near Narbonne. It is about 130 miles long.

**AUDEBERT,** ōd'bâr', JEAN BAPTISTE (1759–1800). A French naturalist and painter, born in Rochefort. In Paris he soon won success as a miniature painter. His love of natural history and his skill in painting birds and animals secured him employment in this field. For the purpose of making sketches he visited Holland and England in 1800. That year he produced his *Histoire naturelle des singes* ('Natural History of Monkeys'), a large folio, with 63 colored plates, remarkable for their truth and beauty. After his death two more volumes appeared, which were even more excellent than the first. They were his books on humming birds, and on woodpeckers and birds of paradise (1802).

**AUDHUMLA,** ou-DHŌŌM'lȧ. According to the myths of the Scandinavian cosmogony, the name of the cow upon whose milk the giant Ymir subsisted. She licked the frost of the icy abyss, Ginnungagap, and forth sprang Buri, the father of Borr and grandfather of Odin.

**AUDIFFRET-PASQUIER,** ō'dē'frā'pȧs'kyā', EDME ARMAND GASTON, DUC D' (1823–1905). A French statesman, born in Paris. In 1862 he inherited the title of Duc de Pasquier from a granduncle. During the reign of Napoleon III he was identified with the Orleanist opposition and under the presidency of Thiers was one of the Moderate Conservative Party. In 1875 he was chosen President of the National Assembly, which he had entered in 1871, and though he had been an avowed supporter of the Bourbon restoration, he then accepted the Republic. He was the first life Senator elected by the Assembly (1875); was President of the Senate from 1876 to 1879, and in 1878 was elected to the French Academy.

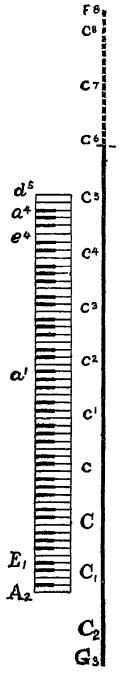
**AU'DIOM'ETER** (hybrid form, from Lat. *audire,* to hear + Gk. *μέτρον, metron,* measure). An instrument for the measurement of hearing, invented by Prof. D. E. Hughes, of London, in 1879. It consists of a battery, a microphonic key, two primary coils mounted at the extremities of a graduated bar, a secondary or induction coil which moves along the graduated bar, and a telephone, the terminals of which are connected with the terminals of the induction coil. The battery is connected with the microphonic key and the two primary coils, and the telephone is held at the ear of the person whose hearing is being tested. The amount of sound

can be gradually increased by moving the induction coil from the centre toward the larger of the two primary coils, and diminished by moving it toward the centre, the position at which it disappears being noted.

**AU'DIPHONE** (hybrid form, from Lat. *audire*, to hear + Gk. *φωνή*, *phōnē*, sound). An instrument to assist the hearing of persons whose auditory nerve has not been entirely destroyed. One variety of audiphone consists of a thin sheet of ebonite rubber, hard vulcanite, fan-shaped, and having strings leading from the outer edge to the base of the handle, so that it may be brought to different degrees of convexity. When the outer edge is pressed against the upper front teeth and the convex side is outward, sound vibrations are conveyed to the auditory nerve through the teeth and bones of the head. This instrument has been generally abandoned in favor of the ear trumpet, and of the modern electric hearing devices built on the same principle as the telephone.

**AUDI'TA QUERE'LA** (Lat. the complaint having been heard, from *audire*, to hear, and *querela*, complaint). A form of action which lies for a defendant against whom judgment has been rendered (and who is therefore in danger of an execution), to restrain or prevent the execution, on account of some matter occurring after judgment, amounting to a discharge, as payment or release of the debt for which judgment was given. Blackstone describes it as an action of a high remedial character, in the nature of a bill in equity to be relieved against the oppression of the plaintiff, invented to protect a party who has a good defense, but is too late to make it in the ordinary forms of law (*Comm.* iii, 406). The modern practice of the courts in granting summary relief upon motion, in cases of such oppression, has generally superseded this form of remedy, but it may still be employed in many States of the United States where complete justice cannot be done in this summary manner. See EXECUTION; JUDGMENT; SUPERSEDEAS; ARREST OF JUDGMENT.

**AUDITION,** ą-dĭsh'ŭn, **AU'DITORY SENSA'TION** (Lat. *audire*, to hear). Our sensations of hearing fall into two great groups, as sensations of tone and sensations of noise. The former are musical, smooth; the latter, abrupt, rough, and harsh. The physical stimulus of auditory sensation is the vibration of some material body that is transmitted to the ear under ordinary conditions by a wave movement of the air particles, a to-and-fro motion in the direction in which the sound travels (longitudinal vibration). If the wave movement be that of a simple sinusoidal curve (pendular vibration), the resulting sensation is a simple tone. If the wave movement be cut short at a very early stage of its progress, or if the air be disturbed by a mere shock or concussion, we have the sensation of simple noise. The tone of a tuning fork, standing upon its resonance box, is practically a simple tone; the pop of a soap bubble is an instance of a simple noise. The musical tones of ordinary experience are doubly complicated; they consist of a number of simple tones, sounding together, and are further accompanied by complex noises. The tone emitted by a violin string, e.g., contains a half-dozen different simple tones, which may be discriminated under proper conditions (see CLANG-TINT), as well as the scraping noise that arises from the drawing of the bow across the string. The noises of every-day life (crash, thump, clatter) are similarly complicated; they consist of a number of simple noises, among which a tonal element may often be distinguished.




AUDITION.

The series of tonal qualities. The keyboard of a grand piano extends from the $A_2$ of 27½ vs to the $c^5$ of 4224 vs. The range of audition is approximately from the $G_3$ of 12⅝ vs. to the $f^8$ of 45,056 vs.

The series of simple tonal qualities forms what is technically termed a continuous one-dimensional manifold; i.e., tones may be arranged along a single line, or scale, within which every term is separated by insensible gradations from the terms next preceding and following. Music employs less than 100 discrete tones, lying between the *e* of 41¼ and the *d* of 4752 vibrations in a second. The range of hearing is much wider, extending, under favorable circumstances, from the *g* of 12⅝ approximately to the *f* of 45,056. The lower limit is determined by means of giant tuning forks, of vibrating strips (*lamellæ*) of steel, or of weighted wire forks; the upper limit by miniature tuning forks, by small steel cylinders, and by an adjustable piston-whistle (Galton's whistle) actuated by a rubber bulb. Between these extreme limits the ear can distinguish no less than 11,000 tonal qualities, or more than 100 times as many as are employed by orchestral music. So acute is our discrimination of tones that, in the middle region of the musical scale, two tones will be judged as different by a trained observer whose vibration rates differ by but 0.2 vibrations in a second. Measurements of this sort require a delicate apparatus, which has usually taken the form of a series of tuning forks, whose pitch can be varied at will by the movement of a rider along their prongs, or of a series of reeds, very carefully tuned to minute differences of pitch, sounding under wind pressure.

The psychology of the simple noises is as yet incomplete. There seems to be no doubt that noises show differences of quality or pitch more or less resembling those of tones. The crack of a pistol is "higher" than the roar of a cannon; the snap of a large soap bubble is "deeper" than the snap of a small one. Experiments have been made in which the sound of a tuning fork is cut off from the observer's ear before the prongs have executed two complete wave movements; the sound in such a case is not a tone, but a noise. The results seem to indicate that we can distinguish between 500 and 600 simple noises, or that there are about 20 times fewer noise than tone sensations. This statement, however, requires confirmation. It has recently been suggested that there are two ultimate types of simple noise: the snap

(electric spark, soap bubble, curtained sound of fork) and the hiss; but no classification of hisses by pitch or quality has been attempted.

A word must be said about two striking phenomena of auditory sensation—beats and combination tones. 1. If two tones whose vibration rates are slightly different are sounded together, the resulting sound is not smooth, but "wavy"; it fluctuates in intensity, according as a hill of the one curve coincides with a hill or with a valley of the other. Thus two tones of 100 and 101 vibrations in the 1 sec. beat once in the 1 sec.; tones of 100 and 102 beat twice; and so on. Beats can be counted up to about 5 in the 1 sec., and can be heard separately up to about 60; beyond this limit the beating complex merely sounds harsh and rough. In certain cases the two beating tones give rise to a third—intermediate—tone which carries the beats. 2. If two tones are sounded together, various extra-tones are generated, whose vibration rates stand in definite relations to the vibration rates of the primary tones. Most important, theoretically, are (*a*) the first difference tone and (*b*) the summation tone. The pitch number of the former is equal to the difference between the vibration rates of the two generators. Thus tones of 300 and 400 vs. produce a first difference tone whose pitch number is 100. The pitch number of the latter is equal to the sum of the vibration rates of the generators; thus tones of 300 and 400 vs. produce a summation tone of 700. It was formerly thought that the difference tone is a beat tone, and that the summation tone is due to the presence of overtones in the primaries; but the difference tone, unlike the beat tone, cannot be obtained by the superposition of pendular vibrations. While it is true that a few instruments, like the harmonium, produce objective difference tones, due to secondary vibrations of the sonorous body, most difference tones are subjective, occasioned within the mechanism of the ear itself. The summation tone is apparently produced in the same way as the difference tone.

Sensations of sound appear to have developed from general bodily sensations of jar or tremor. (See STATIC SENSE.) The first auditory sensation proper is, probably, the noise; this theory is borne out by facts of genetic psychology as well as by the circumstance that, for our own ears, the physical stimulus of noise is an imperfect tonal stimulus; the sensations are different in kind, but their exciting causes differ only in degree. The ruling theory of audition, that of Helmholtz, maintains that tonal sensations are set up by the vibration of the cross fibres of a triangular membrane stretched between the bony walls of the cochlea of the internal ear. This "basilar" membrane represents, in miniature, the arrangement of a harp, or of the backboard of an upright piano; the long strings are tuned to the bass tones, the short strings to the treble tones. The external air wave strikes the drumskin of the ear, is transmitted inward by the chain of auditory ossicles, and arouses a wave movement in the endolymph of the internal ear. The motion is taken up by that basilar fibre which is "tuned" to its particular rate; the motion of the fibre excites the hair of a sensory cell resting upon it; and the nervous impulse passes from this cell along the auditory nerve to the brain. An overlying membrane, the "tectoria," acts as damper, to bring the vibrating hair to rest again. The details of the theory, as amended by Hensen, Exner, and Ebbinghaus, afford a fairly satisfactory explanation of the details of auditory sensation. We have seen that there are some 11,000 tonal qualities. It has been found that the basilar membrane consists of 16,000 to 20,000 cross fibres—more than enough to serve as the basis of these sensations. The qualities of noise we may suppose to be mediated by the simultaneous jarring of a number of adjacent basilar fibres. Beats are accounted for on the hypothesis that the incoming air wave sets in vibration not only the basilar fibre which is specifically attuned to it, but (in a lesser degree) the neighboring fibres as well. If, then, two fibres that lie near together within the membrane are set swinging by two waves of but slightly different rates, the fibres lying between these two will also be affected, and affected by both stimuli. There is, consequently, interference of the two wave motions in this narrow intermediate strip of membrane, and the intermediate tone (which carries the beats) is aroused. Combination tones were explained by Helmholtz as due to asymmetrical vibrations of the conductive apparatus (ossicles and membranes). Ebbinghaus has restored them to the cochlea by two simple and natural extensions of Helmholtz's principles. He supposes (*a*) that a simple wave movement of the endolymph excites a limited number of adjacent fibres, and thus a number of hair cells; and that the cells are not so sharply differentiated in function but that all alike (though in varying degrees) can mediate the same tonal sensation; and (*b*) that a given wave motion excites not only its own particular basilar string, but also (within certain limits) the strings that are attuned to its harmonic undertones. Thus a stimulus of 600 vibrations in the 1 sec. would, perhaps, excite the strings attuned to 599.6, 599.8, 600, 600.2, 600.4; and the cells lying upon these strings would all alike give the tone 600 in sensation. Moreover, the stimulus 600 would excite not only the 600-string, but also the strings that respond directly to stimuli of 300, 200, 150, 120, etc. These assumptions afford an easy explanation of the phenomena in question. We may add that the Helmholtz theory has received confirmation on the pathological side by the discovery that, in certain individuals, the hearing of tones is abrogated over a definitely circumscribed portion of the scale (tonal gap), or is abrogated in general, but retained over a similarly circumscribed area (tonal island)—facts that accord admirably with the functions ascribed hypothetically to the strings of the basilar membrane. Vivisectional experiments on dogs seem to show that excision of the tip of the cochlea (where the membrane is widest) produces a deafness to bass tones; but the confirmation of this is required.

In spite of its explanatory powers, the Helmholtz theory has never lacked opponents. Various objections have been urged against it; as, that the theory, in assuming that the ratio of width of the two ends of the basilar membrane is about 1:12, greatly overstates the triangularity of the membrane; that the membrane is too closely woven for its radial fibres to vibrate, even in small batches, not to speak of the separate vibration of single fibres; that the structures of the cochlea are too minutely small for the strings to act as resonators to the deep

tones which audition can distinguish; and so on. Hence a number of theories have arisen which reject the idea of resonance altogether, and assume that the basilar membrane vibrates in one piece. Waller's theory, which we may take as typical of this direction of thought, is formulated as follows: the basilar membrane is "a long, narrow drumhead, repeating the complex vibrations of the membrana tympani." It "vibrates in its entire area to all sounds (although more or less in some parts than in others), giving . . . acoustic pressure-patterns between the membrana tectoria and the subjacent field of hair cells. In place of an analysis by consonation of particular radial fibres, . . . varying combinations of sound give varying pressure-patterns, comparable to the varying retinal images of external objects." No one of these opposing theories has been worked out in any conspicuous detail. (See EAR; ACOUSTICS; PSYCHOLOGICAL APPARATUS.) Consult: Helmholtz, *On the Sensations of Tone* (Eng. trans., London, 1895); Ebbinghaus, *Grundzuge der Psychologie* (Hamburg, 1897–1902); Waller, *Introduction to Human Physiology* (New York, 1891); Titchener, *Text-Book of Psychology* (New York, 1910).

**AU'DITOR** (Lat., hearer, from *audire*, to hear). At common law, an officer appointed by the court in the action of account to take and state the items of debit and credit between the parties to the action, determine the balance due, and report to the court.

Similar officers were appointed in chancery, who were more usually known as masters in chancery. (See MASTER IN CHANCERY.) As the common-law action of account fell into disuse, courts of common law ceased to appoint auditors; but under modern statutes, the law courts have power to appoint officers exercising quasi-judicial functions in the taking of accounts, taking of evidence, trial of issues, etc., variously known as auditors, commissioners, or referees. (See COMMISSIONER; REFERENCE.) Their reports, when filed and confirmed, form the basis of the judgment rendered by the court. The powers and duties of such officers are, in general, limited and defined by the statutes authorizing their appointment.

The term "auditor," as now employed, however, more commonly has reference to a class of persons, usually expert accountants, who have increased in numbers to meet the demands of the growing importance and complexity of industrial and financial affairs, and who perform the service of examining and stating the accounts of government departments, corporations, and private concerns. Many of our large cities, as well as the State and general governments, have official auditors (called, in New York City, commissioners of accounts) as a part of the regular administrative machinery; and the same is true of many of the larger industrial corporations. Private auditors are ordinarily subject to no legal regulation, except such as is imposed by the contract under which they are employed, and the general obligation to exercise a reasonable degree of skill, care, and caution. A higher degree of skill is required of a professional auditor than of one who does not hold himself out as an expert; such skill, in fact, as is exacted of all strictly professional men. In some of the States of the United States a class of public accountants, licensed and registered by the State, is recognized by statute. For the law as to auditors under the English Companies' Acts and other statutes, consult Pixley, *Auditors: Their Duties and Responsibilities* (7th ed, London, 1896).

**AU'DITORY, or EIGHTH, NERVE.** According to the older nomenclature, the *portio mollis* (because it is soft, having no sheath or neurolemma) of the seventh pair. The nerve of hearing. The superficial origin of this nerve is from the ventrolateral surface of the medulla immediately behind the transverse fibres of the pons. Two distinct bundles of fibres can be distinguished in it; one (the cochlear division), passes to the outer side of the restiform body, or inferior peduncle of the cerebellum, while the other (the vestibular division) passes to the inner side of the restiform body. The fibres take their deep origin in the gray matter of the fourth ventricle. The fibres of the cochlear division of the nerve terminate in Corti's organ, situated in the cochlea. The fibres of the vestibular division of the nerve terminate in the hair cells of the *crista* and *macula acustica* in the vestibule and semicircular canals.

The auditory nerve leaves the cranial cavity, in company with the facial nerve, through the internal meatus. At the bottom of the meatus the two divisions of the nerve separate, the vestibular branch passing to the vestibule and semicircular canals, the cochlear branch passing to the cochlea. Within the meatus the auditory nerve is connected by one or two filaments with the facial. See EAR.

**AUDLEY,** ąd'lĭ. A manufacturing town in Staffordshire, England, 4½ miles west of Newcastle-under-Lyne. The most noteworthy building is a church built in the time of Edward II. Pop., 1891, 12,600; 1901, 13,700; 1911, 14,776.

**AUDLEY, or AUDELEY,** SIR JAMES DE (c.1316–69.) An English knight. In 1346 he went to France in the retinue of Edward III and the Black Prince, and in 1350 participated in the naval combat with the Spaniards off Sluys. At the battle of Poitiers (Sept. 19, 1356), he fought with signal valor at the forefront of the English army until overcome by wounds. For his bravery he received an annuity from the Black Prince, who also in 1362 appointed him Governor of Aquitaine. Later he became Great Seneschal of Poitou. He was one of the original knights-companions of the Order of the Garter, instituted by Edward III.

**AUDLEY,** THOMAS, BARON AUDLEY OF WALDEN (1488–1544). An English Lord Chancellor under Henry VIII. He was chosen Speaker of the famous "Long Parliament" in 1529, was made a knight and Keeper of the Great Seal in 1532, and became Lord Chancellor in 1533, succeeding Sir Thomas More, at whose trial he presided. He also conducted the trials of Bishop Fisher, of the supposed accomplices of Anne Boleyn, and of the paramour of Queen Catherine Howard. Throughout his public life he was little more than a tool in the hands of the King and his minister, Cromwell.

**AU'DOE'NUS,** JOANNES. See OWEN, JOHN (c.1560–1622).

**AUDOUIN,** ō'dụ'ăN', JEAN VICTOR (1797–1841). A French naturalist, born in Paris. With Dumas and Brongniart he began the *Annals of Natural Science* in 1824, and with Milne-Edwards made researches on crustacea and annelida. He was professor of entomology in the Museum of Natural History in Paris and in 1838 became a member of the Academy of Sci-

ences. He was also the founder and first President of the Entomological Society. He investigated, at the request of the government, the injuries done to vine and silk culture by insects, and contributed a great number of reports and papers on this subject. He also contributed the part on insects in Cuvier's *Règne animal*.

**AUDRAN**, ō'drän', EDMOND (1842–1901). A French composer. He was born at Lyons; studied music in Paris, and in 1861 followed his father, a teacher at the Conservatory of Marseilles, to that city, where he became choral director at the church of St. Joseph. He returned to Paris in 1881, and collaborated with MM. Chivol and Duru on a number of comic operas, of which the following are the most important: *La mascotte* (1881), a great success; *Olivette, le grand mogol* (1884); *Miss Helyett* (1890), and *La poupée*.

**AUDRAN**, GÉRARD, or GIRARD (1640–1703). The most important member of a family of French engravers and painters. He was born at Lyons; studied under his father and uncle and at Rome under Carlo Maratti, and acquired a high reputation by an important series of engravings of biblical subjects and of Pope Clement IX. He was recalled to France by Colbert, and appointed engraver to Louis XIV. His best-known work is a series of engravings illustrating the battles of Alexander, after the paintings of Lebrun. Others reproduced Mignard's decorations of the ceiling of the royal apartment at Versailles, and the cupola of the church of Val de Grace, a skillful combination of etching and line engraving, and are the very best work of their kind. He published a work entitled *Les proportions du corps humain* (1683).

**AUDREY**, ą'drĭ. 1. A shepherdess in Shakespeare's pastoral comedy, *As You Like It*. Her relations, as the untutored child of nature, with Touchstone, the motley of a court, form some of the most diverting scenes of the play. 2. A character in Jonson's comedy, *A Tale of a Tub*.

**AUDREY**, SAINT. See ETHELREDA.

**AUDUBON**, ą'dụ-bon, JOHN JAMES (?1780–1851). An American naturalist. He was born at Mandeville, in Louisiana, then a Spanish colony, probably in 1780, and died Jan. 27, 1851. This date of his birth, however, is merely a tradition and probably he was born some years before. His father is said to have been a French naval officer, who owned estates in Santo Domingo; his mother, a Spanish creole. His childhood and youth were spent in France, where he was educated, and where he was given instruction in drawing by the painter David. In 1798 he came to America and settled on a farm on the Perkiomen River, near Philadelphia. His father had acquired the property during the Revolutionary War and now gave it to him. Here he lived 10 years, collecting and sketching birds, and applying himself otherwise merely to field sports and social enjoyment. In 1808 he married Lucy Bakewell, the daughter of a neighbor, an Englishman, and at once migrated to the West. After passing 10 years in a vain effort to establish himself in business in Kentucky and Louisiana, and finally losing all his property, he was reduced to supporting himself by drawing portraits and even teaching dancing and fencing. This came about from his persistent inattention to business, which was constantly neglected, as he acknowledges in his autobiographic memoranda, for the sake of pursuing his studies and drawings in natural history, or merely for the pleasures of hunting, fishing, and wandering in the woods. No deepening of his difficulties could cure him of his heedlessness or cause him to forego any opportunity to add to his knowledge or series of drawings of birds.

In 1824 his projects were forwarded by a visit to Philadelphia, where he first became known to the intellectual society of the country and his abilities were recognized. Two years more of painting, teaching, and study, aided by his wife, enabled him to go to England to try to carry out his long-cherished plan of publishing his drawings of birds in a complete series of life-sized colored figures. He interested a sufficient number of subscribers to enable him to begin in London, in 1827, the publication in folio parts, at two guineas each, of his *Birds of America*, which excelled anything of the sort then extant. About five were then issued annually until its completion, in 1838, in 87 parts, containing 435 plates, giving 1065 figures. A complete good copy (of which about 175 sets are supposed to be in existence, 80 of which are in America) is now worth about $2000. No reading matter accompanied these plates, but this was prepared later, and published in Edinburgh, from 1831 to 1839, in five successive volumes, entitled *Ornithological Biography*, the technical part of which was prepared by William McGillivray. Several editions and reprints, with reduced drawings, were made subsequently, of which the most important was the octavo edition of 1844, entitled *Birds of America*. A complete account of these combined works, and of all Audubon's other ornithological writings, is given in the appendix to Elliott Coues's *Birds of the Colorado Valley* (Washington, 1898). The years from 1830 to 1842 were spent in almost incessant travel in all accessible parts of the United States and Canada in search of new materials, or else in Europe, attending to the publication and sale of his great work. In 1842, however, Audubon purchased an estate on the bank of the Hudson River, now included within the city of New York, where a beautiful home was established for himself and his sons, Victor and John Woodhouse, and their families. In 1843 Audubon made a fruitful journey to the upper Missouri River region, the results of which were included in the first octavo edition of his *Birds of America* (1844). Thenceforth he devoted his energies mainly to the preparation of a standard work on American mammals, for which his sons not only collected much material, but for which John drew half of the colored plates; while John Bachman contributed technical and other parts. It was published in New York as Audubon and Bachman's *Quadrupeds of North America*, the first volume dated 1846 and the last 1853–54.

Audubon failed rapidly after 1847, gradually lost the use of his mind, died in 1851, and was buried in Trinity Cemetery, New York, close to his home woods, which now form a beautiful district called Audubon Park. As a man he was endowed with a hardy and most attractive frame, a winning disposition, and a brilliant, poetic mind, animated by untiring enthusiasm. He was not learned in science, nor an artist in any broad sense of the term; but his work has been a source of immense pleasure and inspiration.

The best and fullest biography of him is by his granddaughter Maria R. Audubon, entitled *Audubon and his Journals*, with zoölogical and

other notes by Elliott Coues (2 vols., New York, 1897). A previous *Life of John James Audubon, the Naturalist* (New York, 1869) was written by another relative, Lucy Audubon. Still earlier is Buchanan's *Life and Adventures of J. J. Audubon* (2d ed., New York, 1864), which contained many errors and was not approved by his family.

**AUDUBON SOCIETY.** See ORNITHOLOGICAL SOCIETIES.

**AUE,** ou'*e*. A town in the circle of Zwickau, Saxony, Germany, at the confluence of the Mulde and the Schwarzwasser, 18½ miles southeast of Zwickau by rail. It is a railway junction, the seat of a district court, and a busy industrial centre. It has five public buildings, and its institutions include a *real-schule*, and technical schools in connection with the tin and lace-making industries. Aue's manufactures include furniture, working tools, cardboard, tobacco pipes, and sheet-metal ware, and there are iron foundries, machine shops, breweries, and cotton mills. Pop., 1900, 15,230; 1910, 19,360.

**AUE,** au'*e*, HARTMANN VON (c.1170–c.1215). One of the best court epic poets of German mediæval classical literature. Born the vassal of a Swabian Herr von Aue, he was well educated, and took part in one of the Crusades (1189 or 1197?). More or less under the influence of the French poet Chrestien de Troyes, he wrote the following very popular epics: *Erec* (10,135 lines), which introduced the Arthurian romances into Germany, and which is apparently one of his earliest works, having as its theme woman's devotion; *Iwein* (8166 lines), the poet's most finished work as to form, which surpasses its French source in tenderness of feeling and in its light, happy style, and treats a similar theme from another point of view; *Gregorius* (3752 lines), a mediæval "Œdipus," given a happy ending; and *Der arme Heinrich* (1520 lines), his most popular work and the only one based on a German legend—a simple poem of great charm, which seeks to glorify both the self-sacrifice of woman and the moral fibre of man. He also wrote lyrics in the style of the day. There are many excellent editions of his works.

**AUENBRUGGER,** ou'*e*n-brŭ'gĕr, **VON AUENBRUGG,** ou'*e*n-brŭg, LEOPOLD (1722–1809). A Viennese physician, born in Gratz, Styria, who introduced the method of percussion diagnosis in diseases of the chest. He published the results of his important investigation in a treatise entitled *Inventum Novum ex Percussione Thoracis Humani Interni Pectoris Morbos Detegendi* (1761), which marks an epoch in the modern history of medicine. The book attracted little attention until it was translated and illustrated by Corvisart in 1808. He also wrote two treatises on insanity.

**AUER,** ou'ĕr, ALOYS, RITTER VON WELSBACH (1813–69). An Austrian printer. He was born at Wels, in Upper Austria, and was trained in a printing establishment of his native town to be a compositor. During his scanty leisure moments he studied French, Italian, English, and other languages, in which he underwent an examination in 1835 and 1836 before the University of Vienna. In October, 1837, he was appointed professor of Italian in the Gymnasium of Linz, in Upper Austria. In 1839 he set out on his travels through Germany, Switzerland, France, and England, collecting materials for his favorite art. From 1841 to 1864 he was director of the Imperial printing office at Vienna, which under his management became one of the largest establishments of the kind in Europe. He was prolific in typographical inventions and made known a photographic discovery, "spontaneous impression," in *Die Entdeckung des Naturselbstdrucks* (1854); published *Die Sprachenhalle oder das Vaterunser in 608 Sprachen*, with Roman types (1844); *Das Vaterunser in 206 Sprachen*, with their national alphabets (1847); *Die Buchschriften des Mittelalters* (1852); *Geschichte der K.-K. Hof- und Stadts-druckerei in Wien* (1851), etc. See NATURE PRINTING.

**AUER,** LEOPOLD (1845—). A violinist, born at Veszprim, Hungary, and educated at the Conservatory of Budapest and at Vienna. From 1863 to 1865 he was concert master at Düsseldorf, and from 1866 to 1868 he held the same position at Hamburg, under Stockhausen. Afterward he became professor at the Conservatory of St. Petersburg and violin soloist to the Russian court. From 1887 to 1892 he was director of the symphonic concerts given by the Imperial Musical Society of Russia. He came to be considered one of the foremost violinists of the day, his playing being characterized by extraordinary technical skill, depth of conception, and remarkable beauty of tone. His concert tours were very successful. In 1895 he was raised to the rank of the hereditary nobility. He is, moreover, not only one of the greatest teachers, but undoubtedly he has trained more artists who subsequently attained world-wide renown than any other teacher. Elman and Zimbalist are among his pupils.

**AUERBACH,** ou'ĕr-bäg, BERTHOLD (1812–82). A German novelist born at Nordstetten. He was the founder of the contemporary German "tendency novel," in which fiction is used as a means of influencing public opinion on social, political, moral, and religious questions. Auerbach was of humble Jewish parentage, but had a liberal education at Tübingen, Munich, and Heidelberg, and was a close student of Spinoza, whose complete works he translated (1841; 2d ed., 1871). Spinoza's philosophy can be traced in the ethics of his novels of the higher social life. His life was uneventful, though imbittered at the close by the growth of German anti-Semitism. His best-known works are *Das Judentum und die neueste Litteratur* (1836); a semi-biographical novel, *Spinoza* (1837); *Dichter und Kaufmann* (1839); *Der gebildete Burger* (1842), an attempt to popularize philosophical subjects; *Schwarzwalder Dorfgeschichten* (1843), his first great success, widely translated, and expressing with a sympathetic realism the memories and scenes of youth. This was followed in the same field by the hardly less charming second series of *Village Tales* (1846), *Barfüssele* (1856); *Joseph im Schnee* (1861); *Edelweiss* (1861); a third series of tales, *Nach dreissig Jahren* (1876), *Der Forstmeister* (1879), and *Brigitta* (1880). Meantime he had written a mass of now insignificant journalistic work, and, among other novels, *Auf der Höhe* (1865; Eng. trans., 1889, etc.), a philosophic romance, blending peasant life and character with that of the higher circles in a royal capital and country-seat. This was an attractive exhibition of doctrinaire ethics and established his reputation in spite of errors in construction and style. *Das Landhaus am Rhein* (1869) was

similar but less successful, and *Waldfried* (1874) sought vainly to draw literary inspiration from German unity and the French war. The rest of his 40 volumes are negligible. All Auerbach's longer work is overweighted with philosophy and a leaden humor. He is best in emotional situations and the sentiments of simple natures; excellent in description, but weak in the management of plot. Still, *Auf der Hohe* has enough inherent reality to triumph over its faults, is still read and worth reading. Auerbach's talent appears to best advantage in the *Dorfgeschichten* and in such modest stories as *Barfussele*, *Edelweiss*, and *Brigitta*. The best edition of his *Works* is that of 1892–95 (18 vols.). Consult: Zabel, *Berthold Auerbach* (Berlin, 1882); E. Lasker, *Berthold Auerbach, ein Gedenkblatt* (1882); A. Bettelheim, *B. Auerbach, der Mann, sein Werk* (1907).

**AUERBACH'S KELLER.** A Leipzig wine cellar and tavern, which occupies much the same place in the hearts of Goethe-lovers that the London "Cheshire Cheese" holds in the hearts of the admirers of Dr. Johnson. It is associated with the early life of the German poet, who in his student days was a regular *habitué* of it, and it is supposed to be the original of the tavern scene in the drama of *Faust*.

**AUERSPERG,** ou'ĕr-spĕrk, ADOLPH WILHELM DANIEL, PRINCE (1821–85). An Austrian statesman. He served in the army from 1841 to 1860 and attained the rank of major. In 1867 he entered political life as a member of the Bohemian Diet, being elected by the Liberal land proprietors, and in 1868 became a member for life of the Upper Chamber of the Austrian Reichsrat. He was Governor of Salzburg from 1870 to 1871, and proved in that position, as well as in his subsequent political life, a stanch supporter of the constitution. From 1871 to 1879 he was the head of the Austrian ministry, as such succeeded in carrying out the electoral reform, securing direct elections to the Lower Chamber of the Reichsrat, and in strengthening the political entente with Hungary.

**AUERSPERG,** ANTON ALEXANDER, COUNT VON (known to literature as ANASTASIUS GRÜN) (1806–76). An Austrian statesman and poet. He was born at Laibach (Carniola), studied at Gratz and Vienna; through his verse became distinguished as a Liberal; and when 26 years old was made Imperial Chamberlain. He was elected to the German preliminary Parliament in 1848 and subsequently to the National Assembly in Frankfort. Under the Constitution of 1861 he was appointed by the Emperor a life member of the *Herrenhaus*, the Austrian upper house, where he continued prominent in opposition to the Feudal-Clerical and Slovenian parties. He was similarly active in 1861–67 in the diets of Carniola and Styria. His first noteworthy and best non-political poem was *Der letzte Ritter*, a cycle of romances (1830; new ed., 1885), eulogizing Maximilian I (and his times) in the metre of the *Nibelungenlied*. With *Spaziergänge eines Wiener Poeten* (1831; 7th ed., 1876), an attack upon the Metternich régime, he attracted great attention. Chief among his further publications are the epics *Die Niebelungen im Frack* (1843) and *Der Pfaff vom Kahlenberg* (1850); translations of popular Slovenic songs; *Volkslieder aus Krain* (1850), and *Robin Hood* (1864), an excellent adaptation of the English ballad material. His poetry is eminently contemplative and at times overburdened with the author's reflections. In its assertion of freedom it was influential during the political controversy of the time, and it still may be read for a number of genuine lyrics. His *Gesammelte Werke* were edited by L. A. Frankl (5 vols., Berlin, 1877); certain of his letters were published as *Briefwechsel mit L. A. Frankl* (Berlin, 1897) and a selection of his *Politische Reden und Schriften* appeared in Vienna in 1906. Consult Schatzmayer, *Anton, Graf von Auersperg* (2d ed., Frankfort, 1872), and Radics, *Anastasius Grün und seine Heimat* (Stuttgart, 1876).

**AUERSPERG,** CARLOS, PRINCE (1814–90). An Austrian statesman. On the advent of the new constitutional era, in 1861, he became a member of the Upper Chamber of the Reichsrath. As a representative of the Liberal landed proprietors in the Diet of Bohemia, and afterward as president of the Austrian House of Peers, he took a conspicuous part in defending the constitutional system against clerical and feudal reaction and in establishing the unity of the Empire. He presided over the Austrian ministry in 1868 and subsequently was a zealous supporter of the Liberal cabinet, at the head of which was his brother Adolph.

**AUERSTÄDT,** ou'ĕr-stĕt. A village in Saxony, 25 miles northeast of Weimar. Here Davout won a great victory over the Prussians under the Duke of Brunswick on the same day (Oct. 14, 1806) that Napoleon defeated their main army at Jena. The battle was fought in a mist, between 48,000 Prussians and 30,000 French. The Prussians lost one-half of their army, while Davout's loss amounted to 7000 men. Consult Lettow-Vorbeck, *Der Krieg von 1806 und 1807*, vol. i, *Jena und Auerstädt* (Berlin, 1891).

**AUF DER HÖHE,** ouf dĕr hē'e. See AUERBACH, BERTHOLD.

**AUFFENBERG,** ouf'en-bĕrk, JOSEPH, BARON VON (1798–1857). A German dramatist, one of the less successful imitators of Schiller. He was born at Freiburg, where he first studied law, but soon began to write dramas. He became president of the committee of the Court Theatre at Karlsruhe several years afterward. The following are a few of his more important dramatic works: *Pizzaro* (1823); *Ludwig XI in Peronne; Der Löwe von Kurdistan; Alhambra; Das Nordlicht von Kasan.* The third edition of his complete works (22 vols.) was published at Wiesbaden in 1855. Consult E. L. Stahl, *Joseph von Auffenberg* (Hamburg and Leipzig, 1910).

**AUFRECHT,** ouf'rĕkt, THEODOR (1822–1907). A German philologist and Sanskrit scholar. He was born at Leschnitz and was educated at the University of Berlin. He early devoted himself to Oriental research, and at the age of 25 published a treatise on Sanskrit accent (Bonn. 1847). In collaboration with Kirchhoff, he issued *Die umbrischen Denkmäler* (1849–51), and with Adalbert Kuhn he founded the *Zeitschrift für vergleichende Sprachforschung* (1852). In 1862 he was appointed professor of Sanskrit and comparative philology at the University of Edinburgh. He left Scotland and accepted a professorship at Bonn, resigning his position in 1889. Among Dr. Aufrecht's many contributions to linguistic science, the most important are an edition of the *Rigveda* in Roman letters (2d ed., Bonn, 1877), *Ujjvaladatta's Commentary* on the *Unadi-Sutra* (a Sanskrit lexico-

graphical work), *Aitareya Brahmana* (1879); *Catologus Catalogorum, An Alphabetical Register of Sanskrit Works and Authors* (Leipzig, 1896–1903), and *Katalog der Sanskrit-Handschriften der Universitats-Bibliothek in Leipzig* (Leipzig, 1901).

**AUGARTEN**, ou'gär-ten (Ger. *Aue*, meadow + *Garten*, garden). A park in Vienna, once noted for its musical associations. Mozart, in 1782, was instrumental in starting concerts there, and it has been the scene of many musical first nights. It was opened in 1775 by Joseph II and is laid out in the old French style.

**AUGE**, ą'jê. See TELEPHUS.

**AU'GEAS**, or **AUGEI'AS** (Gk. *Αὐγέας, Αὐγείας, Augeas, Augeias*). The son of Helios, Eleios, or Poseidon, and Hyrmina or Iphiboe. He was King of Elis and renowned for his wealth in oxen, of which he fed 3000 head in his stables. The cleansing of these stables, from the accumulations of years, in a single day, was one of the labors imposed on Hercules by Eurystheus. The hero bargained with Augeas for a tenth of the oxen as his reward, and then turned the rivers Alpheus and Peneus through the mass of ordure, thus accomplishing his promise. When Augeas refused to pay the stipulated wages, a war ensued and Augeas was slain by Hercules. The fable of the Augean stables serves as an allusion to political corruption. See HERCULES.

**AUGEREAU**, ōzh'rō', PIERRE FRANÇOIS CHARLES, DUKE OF CASTIGLIONE (1757–1816). A marshal and peer of France. He was born at Paris, of humble parentage, and after serving some time in the French carabineers, he entered the Neapolitan service, in which he remained until 1787, when he settled in Naples as a fencing master. With other French residents he was banished from that city in 1792 and immediately volunteered in the French Revolutionary army. In less than three years he was made general of a brigade. In Bonaparte's Italian campaign of 1796 he greatly distinguished himself in the field and in council. He took an active part in the battles of Millesimo, Ceva, Lodi, Castiglione (from which he received his title), Roveredo, and Bassano. In 1797 he was appointed to the command of the Army of the Rhine; but within a few months the Council of Five Hundred, not liking the spirit he displayed there, made him commander of the Tenth Division, at Perpignan. This post he resigned in 1799, when he was elected to the Council of Five Hundred. In 1800 he received the command of the army in Holland and was active in several engagements. In 1804 he was made a marshal. He fought at Wetzlar, Jena, Eylau, in Italy (1809), in Spain (1810), and at Leipzig (1813). During the campaign of 1814 he disappointed the expectations of Napoleon, who had placed great trust in him. Mistrusted by the restored Bourbons, he lived in retirement on his estate till his death in 1816. His character was far from admirable; he was rough, cruel, and selfish; he plundered shamelessly and bought plunder at reduced rates from his men. But he was a brilliant leader and a fearless soldier in the field.

**AU'GERSHELL.** The general English name of gastropod mollusks of the family Terebridæ, suggested by their elongated, sharply pointed spiral form, and solid substance (see Plate of ABALONE, ETC.). They appear by their dentition to be related to the cones and pleurotomes, but otherwise are very distinct, having a very small body and short siphon, proportionately, with the foot short and rounded in front and elongated behind, tipped with a small operculum. They are carnivorous, and the eyes in many species are almost invisible and in all are borne upon minute stalks. More than 200 species are known, most of which are inhabitants of the tropical seas and of the South Pacific. The shells are slender, acuminate, sometimes several inches in length, and often very solid, with flat whorls ornamented with spiral sculpturing, and usually variegated with red, brown, and orange spots and stripes. They occur all the way from the shore to rather deep water, creeping on the bottom in search of prey. The history of the family goes back to the Miocene period.

**AUGER.** See BORING MACHINERY.

**AU'GERWORM'.** The larva of the British goat moth (q.v.).

**AUGIER**, ō'zhyâ', EMILE (1820–89). Probably the greatest French dramatist of the nineteenth century. When comedy was in danger of being stifled between the vaudeville of Scribe and the sensational drama of the Romanticists, he, with the younger Dumas, raised it to a more vigorous, realistic life, and a truer contemporary morality than it had known since Molière. Augier was born at Valence, Sept. 17, 1820, and at first practiced law; but he inherited from his grandfather, Pigault-Lebrun, a prolific though mediocre novelist, a bent for literature, and wrote, while still in a notary's study, *Charles VII à Naples*, which was a failure. *La cigue*, acted in 1844, showed promise and was approved by Ponsard. It achieved success and decided the dramatist's career. It was a Greek play, graceful, witty, and like *Le joueur de flûte*, written also at this time, though not acted until 1850, it pleads, in easy verse, the cause of the courtesan redeemed by love, which his later prose dramas eloquently condemn. *L'aventurière* (1848) presents the same theme in a French setting and was rewritten to suit his later position in 1860. He was still feeling his way, and is next found collaborating with Alfred de Musset in *L'habit vert* (1849), a trifle, and, like *Le postscriptum* (1869), a failure. Then, with *Gabrielle* (1849), begins Augier's second manner. In this "domestic drama" he becomes the champion of average, conventional ethics, allaying the calculations of interest to the language of sentiment, as the Romanticists had never done. From this position *Diane* (1852) shows a momentary recoil, *Philiberte* (1853) a slight advance, and *La pierre de touche* (1853) a decided progress, thanks, perhaps, to the collaboration of Sandeau, who also furnished the plot for *Le gendre de M. Poirier* (1885), Augier's first great drama, thought by many the greatest since Beaumarchais's *Mariage de Figaro*. It is a model comedy of manners, its comic force resting wholly on the interplay of characters, every one of whom is drawn to and from the life, without idealism and yet with no touch of bitterness, such as is felt in Augier's *Ceinture dorée* (1855), a satire of conventional marriage and the stock exchange, foreshadowing his great series of social satires that begins with *Les effrontés* (1861).

Progress toward sterner ethics may be noted in *Le mariage d'Olympe* (1857), which earned Augier his election to the Academy. *La jeunesse* (1858) is insignificant, but *Les lionnes pauvres* (1858) contains, in the cold, cowardly, and perverse Séraphine, Augier's greatest female charac-

ter, and verges on tragedy in the dread of destiny that it rouses at the close. *Un beau mariage* (1859) completes the cycle of "domestic dramas," and *Les effrontés* (1861) turns to the corrupting of society through the struggle for unearned wealth. Here Vernouillet is the typical speculator, and Giboyer the typical venal wit, who, in *Le fils de Giboyer* (1862), becomes a hardly disguised portrait of the clerical journalist, Louis Veuillot (q.v.). In no drama of Augier's is the interest more unflagging, the irony more caustic, and the dialogue more sparkling, than in this triangular struggle between a decaying aristocracy, a vain plutocracy, and the unscrupulous exploiters of both. The dramas that follow hardly reach this height. *Maître Guérin* (1864) is a fine study of the tricky country lawyer; *Paul Forestier* (1868) is insignificant; *La contagion* (1866) and *Lions et renards* (1869) elaborate the theme of *Les effrontés*, and show in Estrigaud a type of the Parisian *blagueur*. After the Franco-German War Augier wrote the patriotic but prosaic *Jean de Thommeray* (1873), *Madame Caverlet* (1876), dealing with divorce, and *Les Fourchambault* (1878), which pushes the illegitimate son to the front and marks by its melodramatic sentiment the beginnings of a reaction from literary naturalism. Augier's style is vigorous, often daring, in its use of new words and even of slang. His moral earnestness makes him at times harsh; but he looked at the world with the honest sympathy of an upright and sincere student of nature. He died at Croissy, Oct. 25, 1889. Consult: Parigot, *Emile Augier* (Paris, 1890); Lacour, *Trois théâtres* (Paris, 1880); Matthews, *French Dramatists* (New York, 1881); Doumic, *Portraits d'écrivains* (Paris, 1894); Gaillard, *Emile Augier et la comédie sociale* (Paris, 1910), and Wells in his *Modern French Literature* (Boston, 1899).

**AUGITE**, ą'gīt. See PYROXENE.

**AUG'MENTA'TION,** IN HERALDRY. See HERALDRY.

**AUGMENTATION.** In music, the repetition of a theme in such a manner that each note is increased to double its original value. Augmentation occurs most frequently in the fugue, but also has its value in the free style of writing. For augmentation of intervals, see INTERVAL.

**AUGSBURG,** ougz'burk (Lat. *Augustus*, the Roman Emperor who built it + Ger. *Burg*, fort, stronghold; anc. *Augusta Vindelicorum*, Augusta of the Vindelici). Capital of the Bavarian government district of Suabia and Neuberg, situated in lat. 48° 21′ N., long. 10° 54′ E., 39 miles west-northwest of Munich by rail (Map: Germany, D 4). It is situated about 1600 feet above sea level on a point of land formed by the junction of the Wertach and Lech rivers, and has a mean annual temperature of about 45° F. It consists of the inner town and six suburbs, and in spite of the fact that its ancient fortifications have been removed, and their place taken by broad avenues and squares, the town still presents a distinctly mediæval appearance, the Jacober Strasse, a continuation of the Barfüssergasse, being rich in buildings of the sixteenth and seventeenth centuries. The main thoroughfare is the handsome Maximilianstrasse, lined with numerous interesting buildings. Several of the churches are fine Gothic structures, notably the cathedral, begun in 995 as a Romanesque basilica, but altered in the fourteenth century to the Gothic style, with fine bronze doors, old stained-glass windows, and several altarpieces by Holbein the Elder. Among the others may be mentioned the church of St. Anna, dating from the fourteenth century, with several valuable altarpieces; and the beautiful memorial chapel of the Fugger family; the two churches (Roman Catholic and Protestant) of St. Ulrich, the former being particularly rich in ornamental metal work; and the church of the Holy Cross, dating from the twelfth century. The most notable of the secular buildings is the handsome Renaissance Rathaus, built in 1615–20, by Elias Holl, and containing the famous so-called Golden Hall, one of the finest in Germany; the former palace of the prince-bishops in which in 1530 the Augsburg Confession was presented to the Emperor; and the Fugger House, with rich frescoes, illustrating the history of the town. There is a royal picture gallery, containing a number of paintings belonging to the old German school as well as several specimens of early Dutch masters. There are also a number of learned societies, a city library with 200,000 volumes, and a collection of archives containing many valuable documents relating to the early history of Germany. The town is celebrated for its numerous beautiful fountains. It contains a fine theatre, opened in 1877, and publishes six daily newspapers. Charitable and benevolent institutions are numerous, and some of them were founded in the beginning of the thirteenth century. Augsburg increased considerably in industrial importance during the nineteenth century. It contains large cotton and woolen mills, and machine shops, and manufactures acetylene gas, paper, chemicals, jewelry, and leather. Pop., 1890, 75,523; 1900, 89,109; 1910, 102,487, mostly Roman Catholic.

Augsburg was founded about 14 B.C. It was laid waste by the Huns in the fifth century, by Charlemagne in the eighth, and by Welf of Bavaria in the eleventh; it rose each time only to greater prosperity. In 1276 it became a free city of the Empire, and reached the summit of its prosperity toward the end of the fourteenth century. About this time (1368) its aristocratic government was set aside for a democratic constitution, which lasted for 170 years, till the aristocracy, favored by Charles V, regained the ascendency. At the time of the Reformation it was one of the most flourishing cities of Europe, preëminent in commerce, manufactures, and art. By the side of Nuremburg it was an emporium of the trade between northern and southern Europe, and its merchants were princes whose ships were in all seas. (See FUGGER, WELSER.) It was also the centre of German art, as represented by the Holbeins, Burgkmair, Altdorfer, and others. Many diets of the Empire were held in Augsburg, and the leading events of the Reformation are associated with its name. (See AUGSBURG CONFESSION.) The discovery of America, and of the road to India by the Cape, together with its sufferings during the Thirty Years' War, destroyed the town's prosperity. It lost its freedom with the abolition of the German Empire in 1806 and was incorporated with Bavaria. Consult: *Die Chroniken der schwäbischen Städte, Augsburg* (Leipzig, 1865–96); Lewis, "The Roman Antiquities of Augsburg and Ratisbon," in vol. xlviii, *Archæological Journal* (London, 1891); Werner, *Geschichte der Stadt Augsburg* (Augsburg, 1900).

**AUGSBURG CONFES'SION.** The chief credal statement of faith in the Lutheran church.

Its history is the following: With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V, as protector of the Church, had convoked a diet of the Empire, to meet at Augsburg, on April 8, 1530, and had required from the Protestant States a brief summary of the doctrines in which they differed from the Catholic church. The Elector John, of Saxony, therefore, in March, called on his Wittenberg theologians—Luther, Melanchthon, Justus Jonas, and Bugenhagen—to draw up articles of faith. They took as a basis, in so far as pure doctrine was concerned, articles signed at the Colloquy of Marburg (Oct. 1–4, 1529) with the Zwinglians, substituting a strictly Lutheran one on the Lord's Supper, which had been adopted at Schwabach shortly after (October 16). These doctrinal articles, supplemented and with a practical part newly added, were laid before the Elector at Torgau (March, 1530). The Diet of Augsburg was opened June 20, 1530; but Melanchthon had arrived there on May 2, and on the way had begun the famous Confession. This he finished in Augsburg, using as material the articles mentioned and various other papers, besides frequently consulting with Luther, who stayed at Coburg; since, being under the Imperial ban, he was technically an outlaw, and could not safely attend the Diet. The document was first entitled an *Apology*, as if Lutheranism was on the defensive. It was also originally intended to be merely the reply of the Elector of Saxony, but it was so shaped as to be acceptable to all the princes and cities that had accepted Lutheranism in their Confession of Faith. It was a work of infinite labor and reflected the highest credit on Melanchthon. Luther heartily indorsed it. At last, on Saturday, June 25, 1530, it was formally presented to the Emperor in the private chapel of the Episcopal Palace, where the Diet met. It was in both Latin and German and was read aloud in German. But neither original was ever seen again by the Protestants, and both have probably perished.

The Augsburg Confession consists of these parts: I. Preface to the Emperor Charles V. II. Chief Articles of Faith: (1) Of God; (2) Of original sin; (3) Of the Son of God; (4) Of justification; (5) Of the ministry of the Word; (6) Of new obedience; (7–8) Of the Church; (9) Of baptism; (10) Of the Lord's Supper; (11) Of confession; (12) Of repentance; (13) Of the use of sacraments; (14) Of ecclesiastical order; (15) Of ecclesiastical rites; (16) Of civil matters; (17) Of Christ's second coming to judgment; (18) Of free-will; (19) Of the cause of sin; (20) Of faith and good works; (21) Of the worship of saints. III. Articles in which are recounted the abuses which have been corrected. (22) Of both kinds in the Lord's Supper; (23) Of the marriage of priests; (24) Of the mass; (25) Of confession; (26) Of distinction of meats; (27) Of monastic vows; (28) Ecclesiastical power. The document was signed by the Elector of Saxony, the two Dukes of Lüneburg, the Duke of Saxony, the Margrave of Brandenburg, the Landgrave of Hesse, the Prince of Anhalt, the Senate and Magistracy of Nuremberg, and the Senate of Reutlingen.

Melanchthon, not looking upon the Confession as binding, began shortly after to make some alterations in its expressions; at last, in 1540, he published a Latin edition (*Confessio Variata*), in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view to conciliation, he endeavored to unite the views of the Lutherans and Calvinists. This gave rise subsequently to much controversy. Orthodox Lutheranism repudiated the alterations of Melanchthon and long continued to subject his memory to great abuse; though it is clear that Melanchthon and his adherents contemplated no substantial departure in doctrine from the original Confession. Consult Jacobs, *The Book of Concord* (Philadelphia, 1882) for the Augsburg Confession, its documents, and full discussion; Schaff, *Creeds of Christendom*, text in vol. iii, history in vol. i (New York, 1884). The text is also published in pamphlet form by the General Synod of the Lutheran Church in the United States (Philadelphia).

**AUGSBERG IN'TERIM.** See INTERIM.

**AUGUR.** See AUGURIES.

**AU'GUR,** CHRISTOPHER C. (1821–98). An American soldier. He graduated at West Point in 1843, served as aid-de-camp to Generals Hopping and Caleb Cushing during the Mexican War, and took an active part in the campaign against the Oregon Indians in 1856. He was appointed brigadier-general of volunteers in 1861, was severely wounded at Cedar Mountain (Aug. 9, 1862), was promoted major-general in the same month, and subsequently commanded the departments of Washington (1863–66), of the Platte (1867–71), of Texas (1871–75), and of the Gulf (1875–78). In 1886 he retired from the military service. Consult E. P. Augur, *The Augur Family* (Middletown, Conn., 1904).

**AUGUR,** HEZEKIAH (1791–1858). One of the pioneers of American sculpture. He was born in New Haven, Conn., the son of a carpenter, in whose workshop he developed his remarkable talent for wood carving. At his father's wish he became successively a cobbler, grocer's clerk, and a merchant, until the bankruptcy of his firm. He then kept a fruit stand, all the time executing wood carvings for his own pleasure. Finally, several inventions, including a machine for making worsted lace, another for carving piano legs (by a process still in use), and the well-known bracket saw, relieved him from financial stress and enabled him to devote the rest of his life to his beloved art. On the advice of Professor Morse, president of the National Academy of Design, he took up sculpturing in marble. His marble bust of Chief Justice Ellsworth is in the United States Supreme Court, Washington, and his principal production, the so-called group, really two statues, of "Jephtha and his Daughter" is in the Trumbull Gallery, Yale University. With all their defects, due to lack of technical training, these statues show remarkable ability and cause deep regret that the sculptor had not been born at a time and under circumstances more propitious to the arts. Consult E. P. Augur, *The Augur Family* (Middletown, Conn., 1904).

**AU'GURIES** and **AUSPICES** (cf. Lat. *augur, augurium, auspex, auspicium*). These terms are familiar to every reader of Roman history, and are, besides, so frequently employed in English in a secondary and metaphorical sense, that a vague notion of their original meaning is caught up even by those who know nothing of classical antiquities. As, however, the entire religious and political life of the early Romans was deeply penetrated by the influence of their sacred superstitions, and as among these augur-

ies and auspices held a prominent place, a clear conception of what they were is a matter of considerable moment.

Like most primitive nations, the Romans believed that every unusual occurrence had a supernatural significance, and contained, hidden in it, the will of Heaven regarding men. To reveal or interpret this hidden will, as relating to some definite matter, was the privilege of the *augur*, whose name is probably contracted from *avi-ger* (cf. *avis*, 'a bird'), though the meaning of the second element is not clear. The augur was also called, in early times, *auspex*, 'observer of birds' (cf. *avis*, and *specio*, 'look at'), but this name fell into disuse. The augur must be distinguished from the *pontifex*, who directed the religious ritual; also from the *haruspex*, and other prophets, who predicted future events. It was the duty of the augur to determine whether the gods were propitious to a course of action already determined or in progress. Private augurs seem to have existed in the early days; but we are best informed about the public augurs—interpreters of Jupiter Optimus Maximus, as Cicero calls them. The origin of the *collegium augurium*, or 'college of augurs,' is lost in the myths of early Rome; but it is known that, by the Ogulnian law of 300 B.C., five of the nine public augurs must be plebeians, and it seems probable that the original number was three, representing the three early tribes. For more than 200 years the number continued the same, till Sulla, in 81 B.C., increased it to 15. Until 103 B.C. the vacancies seem to have been filled by the college itself; but at that date a more complicated process was introduced, whereby the candidates were nominated by the college, and elected at an assembly of 17 tribes chosen by lot from the 35. Under the Empire this election was transferred to the Senate, but in general vacancies seem to have been filled by the mere recommendation of the Emperor. The last-known augur, L. Ragonius Vetustus, is mentioned in an inscription of 390 A.D. The rank of the augurs was high, and the position was sought by the leading men of the state. It was held for life, and was not inconsistent with the holding of other religious and civil offices. The augurs were one of the four great priestly colleges ranking after the *pontifices*, but before the *decemviri* and *flamines*. They had special seats at the games and a regular income from public lands. Their insignia were the *lituus*, a staff free from knots and with curved head, and the *trabea*, a form of the toga with crimson border and crimson stripes. The augurs solemnly *inaugurated* the new augurs and the flamines, and possibly other officials, inquired about "the safety of the Roman people" at certain definite times, and consulted the gods regarding the harvest. In historic times their most important function was taking the *auspices* in connection with almost any action of the state. This rapidly became a mere religious fiction, to be used to promote or prevent action, according to the wishes of the ruling powers.

Auguries might be of two kinds: (1) "sought" (*impetrativa*), where the observer asked the gods for the sign desired; (2) *oblativa*, where they were unexpected. The modes of divination employed by the augurs, aside from the examination of the entrails of the sacrificial victims, which was done commonly by the *haruspices*, were five in number: (1) *augurium ex cœlo;* (2) *ex avibus;* (3) *ex tripudiis;* (4) *ex quadrupedibus*, and (5) *ex diris*. The first, relating to the interpretation of the celestial phenomena, such as thunder and lightning, falling stars, etc., was held to be of supreme significance, especially in state matters. Thus lightning seen from the left was favorable. The second related to the interpretation of the noise and the flight of birds. It was not every bird, however, that could be a sure messenger of the gods. Generally speaking, those "consulted," as it was called, were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites* (cf. *ala*, 'a wing'), or birds whose flight revealed the will of the gods; the last four to the class of *oscines* (cf. *cano*, 'to sing'; the first element is akin to *omen*, 'a sign'), whose voice revealed the divine will. These two modes of augury were the oldest and most important, though the latter passed almost out of use in historic times. The appeal to the birds was the one most frequently made by ordinary persons. Of the other three, the auguries *ex tripudiis* were taken from the feeding of the sacred chickens. Grain was thrown before the sacred chickens, kept in a cage; if the birds ate readily, without allowing any grains to fall from their mouths, the omen was favorable. The auguries *ex quadrupedibus* were derived from four-footed animals within the limits of a "temple" marked for the purpose (see below); the auguries *ex diris* (a vague kind of augury), from any accidents or occurrences during the taking of the omens. These were usually unfavorable and required the abandonment of the undertaking. Such *diræ*, e.g., the stumbling of a general's horse, might also occur outside of the "temple," and must be obeyed. They fell within the class of *auspicia oblativa*. Their interpretation was the task, usually, of the pontifices rather than of the augurs.

The ground on which the augur stood was solemnly set apart for the purpose, and was called a *templum*, a 'temple.' Between midnight and dawn, usually, the augur took a wand, and marked out the heavens into four regions—*front, rear, right, left*. According as the signs appeared in one or the other of these divisions were the auspices favorable or unfavorable. Signs in the east were, to the Romans as to the Greeks, favorable. The Roman augur, facing *south*, found signs on his *left* favorable: hence the Latin word *sinister*, 'left,' properly means 'favorable.' The Greek augur, on the other hand, facing *north*, found signs on his *right* favorable. The Roman poets frequently adopt the Greek point of view (along with the Roman), and so use *dexter*, 'right,' 'on the right,' in the sense of 'favorable,' and give to *sinister* the meaning of 'unfavorable,' an interesting perversion of meaning which has persisted in its English derivative 'sinister.' How vast the political influence and authority of the augurs must have been is seen from the fact that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, consul, dictator, or prætor, every civic officer, every religious functionary, was invalid if the auspices were unfavorable. No general could lawfully engage in battle unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by any member of the augural college on the ground of an unfavorable omen.

We have employed the two terms, "auguries" and "auspices," as synonymous. But a slight difference is perceptible between them; not the

augurs only, but the chief magistrates of Rome, held the "auspices," while the "auguries" were exclusively in the possession of the former, but the mode of divination and the end to be obtained by it seem to have been the same in both cases, though in the field the method *ex tripudiis* was most common, because of its simplicity.

The right of taking the auspices in war was confined to the commander-in-chief, and any victory gained by a legate was said to be won under the auspices of his superior, and the latter alone was entitled to a triumph. Hence has originated the very common phrase in our language, "under the auspices" of some one, which usually denotes nothing more than that the person alluded to merely lends the influence of his name. Consult: Bouché-Leclercq, *Histoire de la divination dans l'antiquité* (Paris, 1881–82); Wissowa, "Augures" and "Auspicium," in Pauly-Wissowa, *Realencyklopädie der klassischen Alterthumswissenschaft* (Stuttgart, 1896).

**AU'GUST.** See MONTH.

**AUGUST,** ou'gust, EMIL LEOPOLD (1772–1822). Duke of Saxe-Gotha and Altenburg. He succeeded his father, Ernst II, in 1804. He was a great patron of science and art, and founded the famous Chinese Cabinet in the Museum of Gotha. He wrote a series of songs and idyls entitled *Kyllenikon, oder Auch ich war in Arkadien* (1805).

**AUGUST,** FRIEDRICH WILHELM HEINRICH, Prince of Prussia (1779–1843). A general of infantry and inspector-general and chief of cavalry. He was born at Friedrichsfelde and was a nephew of Frederick the Great. He rendered conspicuous services during the Napoleonic War, but was captured at Prenzlau and sent to France, where he was detained as a prisoner of war for 13 months. He fought in the battles of Dresden, Kulm, Leipzig, Montmirail, and Paris, and his famous brigade repeatedly decided the victory. As commander of an army corps, he captured most of the important fortresses on the northern frontier of France in 1815. He is said to have been deeply enamored of Mademoiselle Récamier, whom he had met during his captivity in France at the house of Mademoiselle de Staël and whom he would have married but for political and religious reasons.

**AUGUS'TA.** See AGOSTA.

**AUGUSTA.** A city, and the county-seat of Richmond Co., Ga., on the Savannah River, 221 miles from its mouth, at the head of navigation, altitude from 140 feet above sea level in the main business section to about 450 feet at the highest residential section; lat. 33° 28′ N., long. 81° 54′ W., by rail 132 miles northeast of Macon, 138 northwest of Charleston, S. C., 83 southwesterly from Columbia, and 17 from Aiken. There is also an electric line to Aiken, which eventually is to be extended to Columbia. Two foot bridges and two railroad bridges span the river, which is about 300 yards wide.

Augusta is the greatest cotton-manufacturing centre in the Southern States, the second largest interior cotton market. It received over 550,000 bales in the season of 1911–12. It has many warehouses, one with a capacity of over 100,000 bales. The Augusta Canal, which furnishes from the river the city's water supply and about 12,000 horse power for manufactures, is 9 miles long, 150 feet wide, and 11 feet deep. The cost of its construction, including its enlargement, was about $1,500,000. It is under municipal operation, and Augusta is said to be the only city in the Union where the net income from its public-service properties—water works and power plant—pays the interest charges on its entire debt and the salaries of its officials.

A recently established hydro-electric plant will furnish 30,000 horse power, and the completion of another that is contemplated will add greatly to this. To protect the city from overflows from the river a levee was being built in 1914, upon the construction of which about $3,000,000 was to be spent. A barge line has been established for the carriage of freight by the river, thus giving an all-water route to and from Eastern markets. This, and nine railroads, give Augusta great commercial advantages.

Besides its numerous and extensive cotton factories, from which it gets its name of "the Lowell of the South," Augusta has sash, door, and blind factories, flour mills, wagon works, iron works, brickyards, lumber plants, etc. The principal structures being erected in 1914 were the Empire Life Insurance building, the Augusta Chronicle building, the new government building, for the post office and United States court. A handsome granite building for the Citizens and Southern Bank was erected in 1913.

Augusta has seven banks—the Georgia Railroad Bank, Citizens and Southern, Planters Loan and Savings, Augusta Savings, National Exchange, Merchants, Union Savings—the total capital, surplus, and undivided profits aggregating about $4,500,000; total deposits, nearly $10,000,000. All are members of the Augusta Clearing House Association.

The chief educational institutions are the Medical College, Richmond Academy, Tubman High School (with excellent library), Houghton Institute, Summerville Academy, Sacred Heart College, St. Joseph's and St. Mary's and Sacred Heart academies. Paine College, supported by the M. E. Church, South, is for the training of negro teachers and preachers; Haines Normal and Industrial (or "Lucy Laney") School, and Walker Baptist Institute are negro schools conducted by negro teachers. The public-school system is well supported. There are several commercial schools, two public libraries, a good Y. M. C. A. building; and two daily newspapers—the *Chronicle* (morning), and the *Herald* (evening). The former is the oldest newspaper in the South.

The Medical College, a part of the State University, was incorporated in 1828. The University Hospital, a splendid new edifice, combining two preëxisting institutions in one, and the Wilhenford Hospital for Children, stand on the Medical College grounds (formerly the Orphan Asylum grounds). The Pine Heights Sanatorium (North Augusta) and the Margaret Wright Hospital are excellent private institutions. Among the charitable institutions are the Orphan Asylum, and Widows' Home; and there is an Associated Charities organization.

Richmond Academy is the oldest existing chartered school in Georgia and one of the oldest in the Southern States. Its statutory creation dates from 1783, its organization from 1785.

The Merchants' and Manufacturers' Association and the Georgia-Carolina Fair Association are leading business organizations, the latter holding an annual fair. Among the patriotic and social societies are Colonial Dames, Daughters of the American Revolution, Daughters of the Confederacy, Commercial Club, and Country Club. The golf links of the Country Club are very popular with Augusta's winter visitors.

The city government is composed of a mayor, whose term is three years, and 18 councilmen, three from each ward for a term of three years, one-third being elected each year. The mayor appoints the superintendents of canal and water works, and of streets and drains, the nominations to these positions being subject to confirmation by the town council, whilst other offices are filled by popular election. The police force numbers 91, officers and privates, and there is a finely equipped fire department. Both police and fire departments are governed by a civil-service board. Pop., 1860, 12,493; 1880, 21,891; 1890, 33,300; 1900, 39,441; 1910, 41,040; 1920, 52,548. The city limits have been enlarged since 1910, and the population was estimated at the close of 1913 to be about 50,000.

Augusta was founded in 1735 by Oglethorpe, the founder of the Colony of Georgia, and was named for the daughter-in-law of George II. It is finely laid out, with broad, beautifully shaded streets, and it is one of the most popular winter resorts in the United States. From its beginning it was a great mart for the white settlers and the Indians of that region, and a meeting place for conferences and negotiations between them. It was an important military post before and during the Revolutionary War, and some of the most stubborn and heroic fighting of that war took place there and in the surrounding regions of Georgia and South Carolina. It was captured twice by the British forces, and recaptured finally in 1781 by the Americans under the command of General Pickens and Lieut.-Col. Henry Lee, father of Robert E. Lee. Fort Cornwallis, where the main British force was posted, stood where now stands St. Paul's Church. Fort Grierson, with a smaller British force, stood at Hawkes' Gully, only half a mile away. Not far from there is "Meadow Garden," the home of George Walton, a signer of the Declaration of Independence. A monument to him and the other Georgia signers stands on Greene Street. There are monuments on the same street to the poets Richard Henry Wilde, Paul Hayne, Sidney Lanier, Father Ryan, and James R. Randall, and one to Col. Samuel Hammond, a Revolutionary soldier. On Broad Street there is an imposing monument to Confederate soldiers, with marble statues of Generals Lee, Jackson, Walker, and Cobb, and crowned with one of a private soldier, heroic size. A bronze statue has been erected in Barrett Plaza to Patrick Walsh, a former mayor and United States Senator. The Southern Confederacy's powder works were located at Augusta, and their tall chimney still stands to mark the site.

For a while during and after the Revolution Augusta was the capital of Georgia, and it was there that the Federal Constitution was ratified by that State in January, 1788.

**AUGUSTA.** The capital of Maine, and the county-seat of Kennebec County. It is situated mainly on the west bank of the Kennebec River, 45 miles from its mouth and 74 miles by rail southwest of Bangor (Map: Maine, C 3); is on the Maine Central Railroad, and has connection by steamer with Portland (from which it is 62 miles distant), Boston, and other important cities. It has excellent water power—the Kennebec Dam, 17 feet high and nearly 600 feet long. The most extensive products are lumber, cotton goods, pulp, and paper. Augusta is built on ground rising considerably above the river level, and contains several imposing buildings—the State House, built of granite, and affording a beautiful view from its dome; the City Hall, post office, State Insane Asylum. The city has also a soldier's monument, two hospitals, and two libraries—the Lithgow Library (public), of 8000 volumes, and the State Library, of 60,000 volumes, located in the Capitol. The administration is vested in a mayor and a bicameral council, with the usual subordinate officials. Though trading stations were established here very early, the permanent settlement of the city dates from 1754, when the Plymouth Company built Fort Western. Settlers began to come in 1762, and the place was known as Cushnoc (from the Indian village formerly situated there) until 1771, when it was incorporated as Hallowell. From part of Hallowell a new town was created in 1797, called Harrington at first, and then Augusta. It became the capital of the State in 1831 and was incorporated as a city in 1849. Pop., 1880, 8665; 1890, 10,527; 1900, 11,683; 1910, 13,211; 1920, 14,114. Consult North, *History of Augusta* (Augusta, 1870).

**AUGUSTA** (Lat. fem. of *Augustus*, majestic, venerable). An honorary name bestowed upon women of the Roman Emperor's household as their greatest possible distinction. Livia was the first to receive it. It was sometimes even given to the Emperor's concubines. See CONSTANTINE; AUGUSTUS.

**AUGUSTA,** *Ger. pron.* ou-gus'tâ, MARIE LUISE KATHARINA (1811–90). Queen of Prussia and German Empress, the daughter of Charles Frederick, Grand Duke of Saxe-Weimar. She was brought up at the court of her grandfather Charles Augustus, where she was intimately acquainted with Goethe. On June 11, 1829, she married William, Crown Prince of Prussia, afterward the Emperor William I. She was admired for her culture and beloved for her benevolence.

**AUGUSTA IULIA GADITANA.** See CADIZ.

**AU'GUSTA'LIA.** Games in honor of Augustus, held on August 1, September 23 (the birthday of Augustus), and October 3–12.

**AU'GUSTA'NA COL'LEGE AND THE'OLOG'ICAL SEM'INARY.** Founded at Chicago, in 1860, by the Augustana Synod of the Evangelical Lutheran Church. It removed to Paxton, Ill., in 1863, and to Rock Island in 1875. The institution is co-educational except in the theological department. The library contains 20,000 volumes. The number of students distributed among the various departments is as follows: Theological, 90; collegiate, 136; academic, 188; business, 157; and music and art, 283. President, Gustav Andreen, Ph.D.

**AUGUS'TAN AGE.** The period of highest literary activity in Rome, under the patronage of Augustus and his adviser Mæcenas. At that time the Latin language was in its perfection, and men of letters were held in the highest honor. It was the period of Vergil, Horace, and Ovid. The term "Augustan Age" is also extended to apply to other periods of literary brilliancy, as the age of Addison, Swift, and Steele, in England, and Louis XIV's reign in France.

**AUGUSTAN BAND, THE.** See AUGUSTUS' BAND.

**AUGUSTAN HIS'TORY** (Lat. *Historia Augusta*). The usual title of a collection of biographies of Roman emperors and usurpers from Hadrian to Numerianus (117–284 A.D.), written by six authors, late in the third or early

in the fourth century. The six *Scriptores Historiæ Augustæ* are Ælius Spartianus, Julius Capitolinus, Ælius Lampridius, Vulcacius Gallicanus, Trebellius Pollio, and Flavius Vopiscus. The memoirs are important for matters of fact, in spite of later interpolations and forged documents, but their literary character is poor. A great deal of curious anecdote and much unauthenticated scandal are collected in these lives. The best edition is by H. Peter (Leipzig, 1884); there is an old translation by Bernard (London, 1740). Consult: H. Peter, *Die Scriptores Historiæ Augustæ* (1892); C. Lécrivain, *Etudes sur l'histoire Auguste* (1904); E. Kornemann, *Kaiser Hadrian und der letzte grosser Historiker von Rom* (1905); O. Schulz, *Das Kaiserhaus der Antonine und der letzte Historiker Roms* (Leipzig, 1907).

**AUGUSTA TAU'RINO'RUM.** Anciently, the capital of the Ligurian Taurini; the modern Turin.

**AUGUSTA TREV'IRO'RUM.** The modern Treves (Ger. Trier); in ancient times the capital of the Treviri.

**AUGUSTA VINDEL'ICO'RUM.** The name bestowed by Augustus upon the chief seat of the Vindelici; the modern Augsburg.

**AUGUSTE,** ou-gus'te, **VICTORIA** (1858—). German Empress and Queen of Prussia. She was born at the castle of Dolzig, the eldest daughter of Frederick, Duke of Schleswig-Holstein-Sonderburg-Augustenburg, and of Princess Adelheid of Hohenlohe-Langenburg. She was married to Prince William of Prussia—afterward William II of Germany—Feb. 27, 1881. She became known as a patroness of many charitable enterprises and published a book entitled *Erinnerungsblatter an die Palästinafahrt* (1898), which contains a record of her memorable journey through Palestine in company with Emperor William in 1898. Consult E. Evers, *Auguste Viktoria* (3d ed., 1897).

**AU'GUSTINE**—often called AUSTIN—SAINT (?–604 or 613). First Archbishop of Canterbury. He was originally a monk in the convent of St. Andrew at Rome and became its prior. In 596 he was sent, along with other monks, by Pope Gregory I, to convert the Anglo-Saxons to Christianity and establish the authority of the Roman see in Britain. They got as far as Aix in Provence and there, testified by the reports they heard about the wildness of the Britons, desired to turn back and dispatched Augustine to Rome for permission to do so; but Gregory sent him with a firm but kindly letter to rejoin his company and ordered them to continue on their journey. At the same time he wrote to the Frankish clergy and rulers to share in the enterprise. So, in the spring of 597, Augustine and about 40 companions landed on the Isle of Thanet, in the extreme southeast of England, but at what point is uncertain. The missionaries were kindly received by Ethelbert, King of Kent, whose wife, Bertha, daughter of Charibert, King of Paris, was a Christian, and had Liudhard, Bishop of Senlis, in her suite as chaplain. A residence was assigned to them at Canterbury, then called Durovernum, where they devoted themselves to monastic exercises and preaching. The conversion and baptism (Whitsunday, June 2, 597) of the King contributed greatly to the success of their efforts among his subjects.

In 597 he went to Arles, by direction of the Pope, and was there consecrated Archbishop of Canterbury and Metropolitan of England. On his return he dispatched a presbyter and a monk to Rome to inform the Pope of his success and obtain instruction on certain questions. Gregory's directions with regard to the propagation of the faith are admirable. Thus, instead of destroying the heathen temples, Augustine was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods. Augustine's subsequent efforts to establish his authority over the native British church were not so successful as his missionary labors, owing apparently to his lack of tact. He died in Canterbury, May 26, perhaps 604, though the year is not certain and is sometimes placed as late as 613. His body was removed to the cathedral of Canterbury in 1091. Bede's *Historia Ecclesiastica Gentis Anglorum* is the great authority for the life of St. Augustine. Consult all the documents, in Latin and English, in A. J. Mason, *The Mission of St. Augustine to England* (Cambridge, 1897). The celebration of the 1300th anniversary of Augustine's landing brought out in London in 1897 several volumes upon him—e.g., by E. W. Bensen, Father Brou, S.J., G. F. Browne, W. E. Collins. Consult also J. A. Cooke, *Early Churches in Great Britain Prior to the Coming of Augustine* (London, 1897); Stanley, *Historical Memorials of Canterbury* (New York, 1892).

The site and remains of St. Augustine's monastery were purchased in 1844 by Mr. Beresford Hope, by whom they were presented to the Archbishop of Canterbury in trust, for the erection of St. Augustine's Missionary College, at Canterbury, in connection with the Church of England. This institution was incorporated by royal charter in 1848.

**AUGUSTINE,** SAINT (Lat. *Aurelius Augustinus*) (354–430). Bishop of Hippo, in north Africa, the greatest of the Latin Fathers and one of the most eminent doctors of the Western church. He is called Aurelius Augustinus by Orosius and Prosper of Aquitania. From his autobiographical *Confessions*, and from the biography written by his friend Possidius, we gather the most important facts of his life. He was born in Tagaste, a town in Numidia, Nov. 13, 354, and died in Hippo, Aug. 28, 430, during the siege of that town by the Vandals. His father, Patricius, was a pagan (afterward converted), but his mother, Monica, was a devoted Christian, who labored long and earnestly for her son's conversion and who has been canonized by the Church. Augustine was brought up to be a rhetorician and studied at Tagaste, Madaura, and Carthage. From about the age of 16 until shortly before his conversion, he lived in concubinage, which, along with other youthful irregularities, he afterward bitterly lamented (cf. his *Confessions*, bk. iii). One of the greatest obstacles to his conversion was this state of concubinage, against whose bondage he struggled for a long time in vain; he seemed to be sincerely and deeply attached to the object of his passion, to whom he was faithful for many years. By her he had one son, whom he named Adeodatus ('the gift of God').

The perusal of Cicero's *Hortensius* awakened Augustine to a more serious view of life, and he became an earnest seeker after truth, but experimented with several systems before finally entering the Christian church. For nine years he was a follower of Manichæism (q.v.), a Per-

sian dualistic philosophy then widely current in the Western Empire. With its fundamental principle of conflict between two opposing world powers, symbolized by light and darkness, good and evil, Manichæism seemed to Augustine to correspond to the facts of experience and to furnish the most plausible hypothesis upon which to construct a philosophical and ethical system. Moreover, its demands upon novices (*auditores*) were not strict enough to cause great uneasiness of conscience; witness Augustine's petition recorded in his *Confessions* (viii, 17), "Lord, make me pure and chaste—but not quite yet!" He never advanced to full membership, not becoming one of the *perfecti*. After nine years he abandoned this system, failing after diligent inquiry to find in it the solution of his greatest difficulties. His next stage of development was skepticism.

About this time (383) Augustine left Carthage for Rome. His mother, almost heartbroken at his secret flight, took ship and followed. He did not remain long in the capital, but went on to Milan as a teacher of rhetoric, where he fell under the influence of the Neo-Platonic philosophy, which has so often carried serious thinkers over from doubt to faith, and where he also met the great Bishop Ambrose, who at that time was the most distinguished ecclesiastic in Italy. Augustine presently found himself attracted once more toward Christianity, and asking what answer it had to give to the problems of life. At last, one day, he seemed to hear God saying to him, "Take and read." He turned to the Scriptures and read the words, "Put ye on the Lord Jesus Christ, and make not provision for the flesh, to fulfill the lusts thereof" (Rom. xiii. 14). This decided the question. Augustine resolved to embrace Christianity and to believe as the Church believed. With his natural son he was baptized by Ambrose on Easter Eve, 387. His mother, who had rejoined him in Italy, was rejoiced at this answer to her prayers and hopes. She died soon afterward at Ostia on the return journey to Africa with Augustine.

The remaining 43 years of Augustine's life were devoted to the service of the Church. He returned to Africa, was made presbyter in 391, and Bishop of Hippo in 395, which latter office he held until his death. It was a period of political and theological unrest, for, while the barbarians pressed in upon the Empire, even sacking Rome itself, schism and heresy also threatened the Church. Augustine threw himself into the theological conflict, not from inclination, but from a sense of duty. With voice and pen he waged war, and usually he conquered. The whole of Western Christendom has entered into the fruits of his victories. Besides the Manichæan controversy, Augustine was engaged in two great theological conflicts. One was with the Donatists (q.v.), who held that the purity of the Church forbade receiving back any who had denied Christ under persecution. This Puritan theory Augustine did not share. In the course of this discussion he developed his ecclesiastical and sacramental theories. The other was with the Pelagians, followers of a British monk who disliked the idea of absolute predestination, and related to such doctrinal questions as man's primitive state, the fall, freedom of will, and depravity. In the course of this conflict, which was long and bitter, Augustine developed his theories of sin and grace, of divine sovereignty and predestination. Augustine's doctrine can be treated from two sides, the ecclesiastical and the theological. The Roman Catholic church has found special satisfaction in the former; Catholic and Protestant theology alike are based on the latter. Both Calvin and Luther were close students of Augustine.

He taught that the true Church was characterized by four qualities—unity, holiness, catholicity, and apostolicity. Outside this Church there could be no salvation. It alone was the "ark of safety" in which a perishing world must take refuge through submission to its authority. Convinced of the indispensable necessity of church membership, Augustine finally came to believe it right to coerce the intractable; it was the duty of the Christian state to "compel them to come in." The force doctrine, so repellant to our modern ideas and so fraught with evil in the history of religion, may be found clearly stated by Augustine in his Ninety-third Epistle (408), where he cites the Parable of the Wedding Feast in support of his position, and also in the proceedings of the Synod of Carthage, held in the year 411, which is commonly said to have ended the Donatist schism. Augustine's doctrine stood between the extremes of Pelagianism and Manichæism. Against Pelagian naturalism he held that death came into the world as the result of sin, and that man is saved by divine grace; against Manichæism he vigorously defended free will. A misunderstanding of his position on grace and free will often arises from neglecting to consider that he is at the same time an ardent defender of human freedom against Manichæan fatalism, and the champion of divine grace against the theory of complete human independence.

Augustine was an energetic controversialist, as we have seen. He was also a powerful preacher; but his sermons, owing partly to the great difference between their style and method and that to which we are accustomed, and partly to their fanciful interpretation of Scripture, often disappoint the modern reader. The editors have accepted 363 sermons as genuine, among a much larger number which bear his name. In his great apologetic work, the *City of God*, Augustine appeared in the rôle of seer, unfolding the meaning of the past and the secrets of the future with abundant learning and marvelous fertility of imagination. Ten of the 22 books into which this long work is divided are devoted to refuting the pagan notion that the worship of the gods insures prosperity in this life or in the life to come. The remaining 12 trace the origin, progress, and destiny of the two cities—one of God, the other of this world—with the final triumph of the former, which is the Christian church. Thirteen years of Augustine's busy life (413–426) were occupied with this sublime attempt to construct a Christian philosophy of history. In 428, shortly before his death, Augustine wrote the *Retractions*, in which he registers his final verdict upon the books he had previously written, correcting whatever his maturer judgment held to be misleading or wrong.

The *Confessions* were written in 397; the *Epistles*, of which there are 270 in the Benedictine edition, are variously dated between 386 and 429. Among other important works may be noted his treatise *On Free-Will* (388–395); *On Christian Doctrine* (397); *On Baptism: Against the Donatists* (400); *On the Trinity* (400–416); *On Nature and Grace* (415); and *Homilies* upon several books of the Bible. The Benedictine edi-

tion of Augustine's works is still authoritative (11 vols., Paris, 1679–1700, reprinted in Migne's *Patrologia Latina* and elsewhere); but it is safe to predict that the standard edition will be that now in process of publication under the auspices of the Vienna Academy (in the *Corpus Scriptorum Ecclesiasticorum Latinorum*). The most important of Augustine's works may be read in English in the *Nicene and Post-Nicene Fathers*, first series, edited by Philip Schaff (8 vols., New York, 1886–88). The *Soliloquies* are translated by Cleveland (Boston, 1910). Separate translations of the *Confessions* are numerous, e.g., by W. G. T. Shedd (Andover, 1860) and Charles Bigg (London, 1900). F. R. M. Hitchcock, *St. Augustine's Treatise on the City of God* (London, 1900), is a convenient abstract of the complete work. Consult: "Augustine," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887); Farrar, *Lives of the Fathers*, vol. ii (Edinburgh, 1889); Harnack, *History of Dogma*, Eng. trans. by Neil Buchanan, vol. v (Boston, 1898); Cunningham, *St. Austin and his Place in the History of Christian Thought* (London, 1885); and Harnack, *Augustine's Confessions*, Eng. trans. (London, 1901). For an unfavorable view of Augustine, see A. V. G. Allen, *Continuity of Christian Thought* (Boston, 1894).

**AU'GUSTIN'IANS**, or **AU'GUSTINES.** The name given to several religious bodies in the Roman Catholic church. Although St. Augustine never framed any formal rule of monastic life, one was deduced from sermons attributed to him, and was adopted by as many as 30 monastic fraternities, of which the chief were the Canons Regular, the Knights Templar (see TEMPLARS, KNIGHTS), the Begging Hermits, the Friar Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The *Canons Regular of St. Augustine*, or *Austin Canons*, appear to have been founded or remodeled about the middle of the eleventh century. Their discipline was less severe than that of monks, but more rigid than that of the secular or parochial clergy. They differed from the monks in being all clericals. They lived together, having a common refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. In England, where they were established early in the twelfth century, they had about 170 houses at the time of Henry VIII's dissolution of the monasteries, the earliest, it would seem, being at Nostell, near Pontefract, in Yorkshire. In Scotland they had about 25 houses; the earliest, at Scone, was founded in 1114, and filled by canons from Nostell; the others of most note were at Inchcolm, in the Firth of Forth, St. Andrews, Holyrood, Cambuskenneth, and Inchaffray. In Ireland they had 223 monasteries and 33 nunneries.

The *Begging Hermits, Hermits of St. Augustine*, or *Austin Friars*, one of the four great mendicant orders, were a much more austere order, renouncing all property and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the eleventh and twelfth centuries, existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the rival fraternities of Dominicans and Franciscans, Pope Innocent IV, about the middle of the thirteenth century, imposed on them the rule of St. Augustine, whom they claimed as their founder. In 1256 Pope Alexander IV placed them under the control of a superior or president, called a "general." In 1287 a code of rules or constitutions was compiled, by which the order long continued to be governed. About 1570 Friar Thomas of Jesus, a Portuguese brother of the order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence they were called *discalceati*, or "barefooted friars." At the time of the dissolution of the monasteries of Henry VIII they had 32 houses in England. Omitting the discalced brethren the order has to-day 19 provinces throughout the world, 60 monasteries, 275 foundations, and 2050 members. In the United States there are 200 associates.

The degeneracy of the order in the fourteenth century called into existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged. After Luther had abandoned the order, and entered upon his course of opposition to the Catholic church, he did not spare his denunciations of his former brethren. After the French Revolution the order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and southern Germany. It has diminished even in Austria and Naples, but is still powerful in America.

The name of Augustinians was given also to an order of nuns who claimed descent from a convent founded by St. Augustine at Hippo, of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. For the English Augustinians consult: Clark, *Customs of the Augustinian Canons* (Cambridge, Eng., 1897); *Augustinian Priories of St. Giles and St. Andrew at Barnwell, Cambridgeshire, Observances there* (London, 1897); Allin, *The Augustinian Revolution in Theology*, edited by J. J. Lias (London, 1911).

**AUGUS'TODU'NUM.** See AUTUN.

**AUGUSTOWO**, ou'gus-tô'vō, or **AUGUSTOW.** A town of Russian Poland, in the government of Suwalki, capital of a circle of the same name, on the Netta, a feeder of the Bug, 138 miles northeast of Warsaw (Map: Russia, B 4). It was founded by Sigismund Augustus, King of Poland, in 1557. It has fisheries and lumber interests, manufactures cloth, and there is considerable trade in horses and cattle. Pop., 1885, 10,300; 1897, 12,700.

**AUGUS'TULUS,** ROMULUS. The last Emperor of the western portion of the Roman Empire. His name was Augustus, but the diminutive title under which he is universally known was given him by the Romans on account of the essential pettiness of his character. He was the son of Orestes, a Pannonian of birth and wealth, who rose to high rank under the Emperor Julius Nepos, whose favor he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the Emperor, Orestes conferred the vacant throne on his son, Augustulus (476 A.D.), retaining all substantial power in his own hands. Orestes, failing to conciliate the barbarians, who had helped him against Nepos, with a grant of the third of the lands of Italy, was besieged in Pavia by a large force under the command of Odoacer, and on the capture of the town was put to death. Augustulus yielded at once. Being of too little consequence to be put to death, he was dismissed to a villa near Naples, with an annual pension of 6000 gold *solidi*. His after fate is unknown.

**AUGUS'TUS** (by birth GAIUS OCTAVIUS; after his adoption by Cæsar, GAIUS IULIUS CÆSAR OCTAVIANUS; by decree of the Senate, in 27 B.C., AUGUSTUS) (63 B.C.–14 A.D.). The first Roman Emperor. He was the son of Octavius and Attia (daughter of Julia, the youngest sister of Julius Cæsar). He was born Sept. 23, 63 B.C. The Octavian family came originally from Velitræ, in the country of the Volsci, and the branch from which Augustus descended was rich and honorable. His father had risen to the rank of senator and prætor, but died in the prime of life, when Augustus was only four years old. Augustus was carefully educated in Rome under the guardianship of his mother and his stepfather, L. Marcius Philippus. At the age of 12 Augustus delivered a funeral oration over his grandmother; at 16 he assumed the *toga virilis*. The talents of the youth recommended him to his grand uncle, Julius Cæsar, who adopted him as his son and heir in 45 B.C. At the time of Cæsar's assassination (March 15, 44), Augustus was a student under the celebrated orator, Apollodorus, at Apollonia, in Illyricum, where, however, he had been sent chiefly with a view to gain practical instruction in military affairs. On learning of Cæsar's murder, he returned to Italy, and at his landing at Brundisium was welcomed by deputies from the veterans there assembled; but, declining their offers, he chose to enter Rome privately. At this time he received a copy of Cæsar's will and learned that he had been named by Cæsar as his heir, and had been adopted by him in his will. The city was at this time divided between the two parties of the Republicans and the friends of Marcus Antonius, who was Consul; but the latter had, by adroit manœuvres, gained the ascendency and enjoyed almost absolute power. Augustus was at first haughtily treated by the Consul, who refused to surrender the property of Cæsar. After some fighting, known as the Mutinensian War, which ended in the defeat of Antonius by the forces of the Senate, and his flight across the Alps, Augustus, who had made himself a favorite with the people and the army, succeeded in getting the will of Julius Cæsar carried out. He found an able friend and advocate in Cicero, who had at first regarded him with contempt. The great orator, while imagining that he was laboring in behalf of the Republic, was in fact only an instrument for raising Augustus to supreme power. Presently Decimus Brutus, having assumed control in Gallia Cisalpina, ordered Augustus to oppose Antony; when Octavianus refused to do this, the Senate turned against him, and Octavianus, in self-defense, entered into secret negotiations with Antony. Finally, on receipt of an order from the Senate to fight Antony and Lepidus, he refused and, advancing to Rome, demanded and secured for himself the consulship. When Antonius returned from Gaul with Lepidus, Augustus joined them in establishing a triumvirate, Nov. 27, 43 B.C. He obtained Africa, Sardinia, and Sicily; Antonius, Gaul; and Lepidus, Spain. The Eastern provinces were in control of Brutus and Cassius. The power of the triumvirs was soon made absolute by the massacre of those unfriendly to them in Italy, and by their victories at Philippi over the Republican army, commanded by Brutus and Cassius. After the battles of Philippi the triumvirs made a new division of the provinces—Augustus obtaining Italy, Antony, the East, and Lepidus, Africa. The Perusian War, excited by Fulvia, wife of Antonius, seemed likely to lead to a contest between Augustus and his rival, but was ended by the death of Fulvia, and the subsequent marriage of Antonius and Octavia, sister of Augustus. Shortly afterward, the claims of Sextus Pompeius and Lepidus having been settled by force and fraud, largely through the aid of Agrippa, the Roman world was divided between Augustus and Antonius, and a contest for supremacy began between them. While Antonius was lost in luxurious dissipation at the court of Cleopatra, Augustus was industriously striving to gain the love and confidence of the Roman people and to damage his rival in public estimation. At length war was declared against the Queen of Egypt, and at the naval battle of Actium (q.v.), 31 B.C., Augustus was victorious and became sole ruler of the whole Roman world. Soon afterward Antonius and Cleopatra ended their lives by suicide. The son of Antonius, by Fulvia, and Cæsarion, son of Cæsar and Cleopatra, were put to death; and in 29 B.C., after disposing of several affairs in Egypt (which had now become part of the Roman Empire), Greece, Syria, and Asia Minor, Augustus returned to Rome in triumph, and, closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favor, he abolished the laws of the triumvirate, adorned the city of Rome, and reformed many abuses. At the end of his seventh consulship he proposed to retire from office, in order that the old republican form of government might be reëstablished, but he was ultimately induced to retain his power. Hitherto, since Cæsar's death, the Consul had been named Octavianus (Octavian); but now, in January, 27 B.C., the title of *Augustus* (from Latin *augeo*, 'to increase': it means 'exalted,' 'sacred,' or 'consecrated') was conferred on him. In the eleventh consulship of Augustus (23 B.C.), the tribunitian power was conferred on him for life by the Senate. Republican names and forms still remained, but they were mere shadows. Augustus was in all but name absolute monarch. In 12 B.C., after the death of Lepidus, he had the high title of Pontifex Maximus, or high priest, bestowed on him. The nation surrendered to him all the power and honor that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, etc., Augustus (9 A.D.) suffered the greatest defeat he had sustained in the course of his long rule, in the person of Quintilius Varus, whose army was totally destroyed by the Germans. (See ARMINIUS.) This loss so affected Augustus that for some time he allowed his beard and hair to grow as a sign of deep mourning, and often exclaimed, "O Varus, restore to me my legions!" From this time Augustus confined himself to plans of domestic improvement and reform, and so beautified Rome that it was said, "Augustus found Rome a city of brick, and left it a city of marble." He also founded cities in several parts of the Empire. Altars were raised by the grateful people to commemorate his beneficence; and, by a decree of the Senate, the name Augustus was given to the month Sextilis. Agrippa and Mæcenas were his friends and counselors.

Though surrounded thus with honor and prosperity, Augustus was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He

had no son, and Marcellus, the son of his sister, and Gaius and Lucius, the sons of his daughter, whom he had appointed as his successors and heirs, as well as his favorite stepson Drusus, all died early. Age, domestic sorrows, and failing health warned him to seek rest, and to recruit his strength he undertook a journey to Campania, but his infirmity increased, and he died at Nola (Aug. 19, 14 A.D.), in the seventy-seventh year of his age. According to tradition, shortly before his death, he called for a mirror, arranged his hair neatly, and said to his attendants: "Have I played my part well? If so, applaud me!" Augustus had consummate tact and address as a ruler and politician, and could keep his plans in secrecy while he made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by Augustus himself. He encouraged agriculture, patronized the arts and literature, and was himself an author; but only a few fragments of his writings have been preserved. Horace, Vergil, and other celebrated poets and scholars were his friends. His was the Augustan Age of literature. His death threw a shade of sorrow over the whole Roman world; the bereaved people erected temples and altars to his memory, and numbered him among the gods. For ancient accounts of Augustus' life, see the biography by Suetonius, especially as edited by E. S. Schuckburgh (Cambridge, 1896), and the Monumentum Ancyranum. (See ANGORA.) Consult: Gardthausen, *Augustus und seine Zeit* (Leipzig, 1891–1904); Beulé, *Auguste, sa famille et ses amis* (Paris, 1867); and Boissier, *La religion romaine*, vol. i (Paris, 1883); E. S. Schuckburgh, *Augustus* (London, 1903); J. B. Firth, *Augustus Cæsar* (New York, 1903).

**AUGUSTUS,** APOTHEOSIS OF. A famous cameo in the Cabinet des Medailles et Antiques at Paris. It is cut on a sardonyx, measuring nearly a foot in height, and is the largest cameo known. It contains 26 figures of great Romans, and formerly was thought to represent a triumphal procession of Joseph in Egypt.

**AUGUSTUS,** ARCH OF. A triumphal arch with three openings, erected in honor of Augustus in the Roman Forum in 20 B.C., in commemoration of the restoration of the eagles and prisoners captured by the Parthians from Crassus in 53 B.C. It was destroyed by workmen about 1540, the foundations alone being discovered in 1888 between the temples of Cæsar and of Castor and Pollux. Consult Hülsen-Carter, *The Roman Forum* (Rome, 1906).

**AUGUSTUS,** FORUM OF. The second of the imperial fora at Rome, founded by Augustus. It was surrounded by massive walls and colonnades and was adorned with statues of distinguished men of the Republic. In the centre of the forum stood the temple of Mars Ultor, commemorating the battle of Philippi, and the vengeance exacted by Augustus from Cæsar's murderers, and dedicated 2 B.C. An entrance arch and portions of the walls and of the temple still remain. Consult S. B. Platner, *The Topography and Monuments of Ancient Rome* (New York, 1911).

**AUGUSTUS,** MAUSOLEUM OF. An imposing circular structure of white marble, 280 feet in diameter, erected by Augustus in 28 B.C. in the Campus Martius at Rome. It was surmounted by a cone of earth covered with evergreen trees, and crowned by a colossal bronze statue of Augustus. On the sides of the entrance, on the south, stood two obelisks, now in the Piazza del' Esquilino and the Piazza del Quirinale. On the outer wall, on each side of the entrance, were copies of decrees in honor of those interred in the mausoleum, and the Res Gestæ of Augustus, of which we have a copy in the Monumentum Ancyranum. (See ANGORA.) The first burial in the vaults was that of the young Marcellus in 28 B.C., the last that of Nerva in 98 A.D. During the Middle Ages the cone of earth was removed and the top transformed into a hanging garden. The structure was later used as a stronghold, a bull ring, and a circus. The brick shell is still visible.

**AUGUSTUS,** RES GESTÆ (exploits) OF. See ANGORA; AUGUSTUS, MAUSOLEUM OF.

**AUGUSTUS** (1526–86). Elector of Saxony, the son of Duke Henry the Pious and of Katherine of Mecklenburg. He was born at Freiburg, then the seat of his father's court. While still a youth, he spent some time at Prague, and there formed an intimate friendship with Maximilian, afterward Emperor Maximilian II of Germany. In 1548 he married Anna, daughter of Christian III of Denmark, who was universally popular on account of her devoted adherence to Lutheranism and her fine character. After the death of his brother Maurice, in 1553, Augustus succeeded to the electorate. His rule is chiefly noticeable as bearing upon the history of the newly established Protestant church. In 1555 he was instrumental in bringing about the Peace of Augsburg. Augustus first used his utmost influence in favor of the Calvinistic doctrine; but later he adopted the Lutheran tenets and persecuted the Calvinists. By his skillful internal administration he raised his country far above the level of any other in Germany, introducing valuable reforms both in jurisprudence and finance, and giving a decided impetus to education, agriculture, manufactures, and commerce. He wrote a book on the management of orchards and gardens and commanded that every newly married pair should, within the first year of their marriage, plant two fruit trees. The Dresden Library owes its origin to him, as do also some of its collections. In January, 1586—the Electress having died the year previous—Augustus married a young princess of Anhalt, but died a month after. Consult Falke, *Geschichte des Kurfürsten August von Sachsen* (Leipzig, 1868).

**AUGUSTUS I,** FREDERICK (1670–1733). Elector of Saxony and King of Poland (as such styled Augustus II), commonly called the Strong. He was the second son of the Elector John George III and of the Danish princess, Anna Sophia, and was born at Dresden. In youth he traveled over a great part of Europe and tasted the pleasures of the different courts. When, in 1694, he succeeded his brother George as Elector, instead of turning his arms against France, according to previous arrangement, he undertook the command of the Austro-Saxon army against the Turks in Hungary. After the battle of Olasch, in 1696, he returned to Vienna and set himself up as a candidate for the throne of Poland, vacated by the death of John Sobieski. Bidding higher than Prince Conti for the crown (10,000,000 Polish florins), and adopting the Catholic faith, he was elected King by the nobles, and was crowned at Cracow, on Sept. 15, 1697, as Augustus II of Poland. On ascending the throne he promised to regain for his new

kingdom the provinces that had been ceded to Sweden. He joined Peter the Great in his war against Charles XII, but his forces were repeatedly overthrown by the Swedes. The crown of Poland was wrested from him, and Stanislas Leszczynski was made King in his place. Augustus was forced to sign the ignominious Peace of Altranstädt in 1706, in which he abandoned his claims to the Polish throne. However, on receiving intelligence of the defeat of Charles XII at Pultowa, in 1709, he declared the Treaty of Altranstädt annulled, marched with a powerful army into Poland, of which he again became master, and renewed the war with Sweden, which continued till the death of Charles XII at Frederikshald, in 1718, led first to a truce and eventually to a peace with that kingdom. Meanwhile a confederation of Polish nobles had been formed against the Saxons and fought against them with much success, till, in 1716, through the armed intervention of the Czar, a compact was made between the Poles and Augustus by which the Saxon troops left the kingdom. The King now found himself obliged to employ conciliation, and the splendor of his dissolute court soon won the favor of the Polish nobles, who followed his example but too closely. Saxony had bitter cause to regret the union of the crowns. Its resources were shamefully squandered on the adornment of the capital, Dresden, on the King's mistresses, his illegitimate children, and the alchemists who deluded him with hopes of the elixir of life. Augustus supported the fine arts as ministering to luxury, but did little for the cause of science. Despotic in principle, though easy in temper; ambitious as well as luxurious; reckless alike in the pursuit of war and pleasure, death overtook him in the midst of projected festivities. On his way to the Warsaw Diet, gangrene of an old wound set in, and he died Feb. 1, 1733, and was buried at Cracow. By his wife he left an only son, who succeeded him. The most celebrated of his numerous illegitimate offspring was Maurice of Saxony (Marshal Saxe). Consult Desroches de Parthénay, *Histoire de Pologne sous le roi Auguste* (Hague, 1733–34).

**AUGUSTUS II,** Frederick (1696–1763). Elector of Saxony and King of Poland (as such styled Augustus III). He was the son and successor of Augustus the Strong. Though carefully educated by his mother in the Protestant faith, he adopted Catholicism in 1712 while on a journey through Italy. In this step he was probably influenced by his ambition for the crown of Poland. After succeeding his father in the electorate in 1733, he was chosen King of Poland by a part of the nobility. Aided by Russia and Austria, he triumphed over the rival claims of Stanislas Leszczynski, supported by Louis XV, and was unanimously proclaimed three years later as Augustus III. He left all the cares of government to his favorite, Brühl, who ruined Saxony to minister to the pleasures of his King. In 1740 he opposed Maria Teresa in the hope of gaining territory for Poland, but in 1742 he joined Austria against Frederick of Prussia, but their armies were defeated in 1745, and Augustus had to flee from his capital. He made peace with Frederick and recovered Saxony. In the Seven Years' War Augustus, as the ally of Austria, suffered the loss of his army at Pirna (1756); his country was overrun, his state papers fell into Frederick's hands, and he himself had to flee to Poland, where his popularity, never very great, was much diminished by his recent reverses in Saxony. After the Peace of Hubertsburg (Feb. 10, 1763), Augustus returned to Dresden. He died Oct. 5, 1763. His son, Frederick Christian, succeeded him in the electorate, and Stanislas Poniatowski became King of Poland. Augustus was a spendthrift, like his father, and spent immense fortunes in beautifying his capital, Dresden. Consult Ruthière, *Histoire de l'anarchie de Pologne* (Paris, 1819).

**AUGUSTUS' BAND**—better termed the Augustan Band (Gk. *Σπεῖρα Σεβαστή, Speira Sebastē*, Lat. *Cohors Augusta*). One of the cohorts of provincial troops stationed in Syria during the Roman rule. It is questioned whether it was named Sebaste after the honor title of the Emperor or after the geographical title of Samaria, which was at that time called Sebaste and where the cohort may have been recruited. It did not belong to the legionary forces, which formed the heart of the Imperial army, and consisted only of Roman citizens, but to the auxiliaries, which were recruited from the natives of the provinces in which they were stationed, and consisted of those who did not, generally speaking, possess citizen rights. From the reference in Acts xxvii. 1 it was evidently located in Cæsarea, which, after the deposition of Archelaus (5 A.D.), became the residence of the Procurator of Judæa, incorporated at that time into the enlarged province of Syria.

This band differed from the Italian band (Gk. *Σπεῖρα Ἰταλική*), mentioned, in Acts x. 1, as stationed at the same place, in that the latter was evidently composed of Roman volunteers who had been recruited in Italy.

**AUGUST WILHELM,** vil'hĕlm, Prince of Prussia (1722–58). Founder of the present reigning line of the Hohenzollerns. He was born in Berlin, the second son of King Frederick William I and a brother of Frederick the Great. Although a man of winning personality, he lacked the independence and decision of character of his elder brother. Appointed by Frederick (in 1757) commander of the Army of Kolin, he revealed such a lack of military ability in conducting the retreat from Bohemia that he was deprived of his command, whereupon he retired permanently to his castle at Oranienburg. The accusation brought by him against Frederick in the well-known *Relation über den Feldzug von 1757*, which at first proved so damaging to the reputation of the great commander, was disproved by the publication in 1887 of the *Politische Korrespondenz Friedrichs des Grossen*. As Frederick died without issue, he was succeeded by the son of August Wilhelm, who assumed the title of Frederick William II.

**AUK,** ąk. A name applied collectively to a family of Arctic diving sea birds, Alcidæ, in the order Alciformes, which includes the birds known as guillemots, murres, lomvias, puffins, and auklets. All belong in the north polar regions, taking the place of, and in many ways closely paralleling, the Antarctic penguins. They are particularly numerous upon the Alaskan and Siberian coasts. Some species, however, dwell considerably south of the Arctic Circle, and others formerly did so. Their nearest relatives are the grebes and loons, and by some taxonomists all are included in the single order Pygopodes. They differ from the former by the presence of well-developed tail feathers and lack of lobes upon the toes, and from the loons by the absence of a hind toe. They are thickset, stout birds, only a few living species exceeding a foot

in length; the legs are set so far back that the birds seem to stand on their tails, and are able to move about on land only with difficulty and awkwardly, while the feathers of the wings and tail are so short that flight is feeble and secondary to the use of the wings as paddles for swimming under water, where they progress with remarkable speed and endurance. The sea is their real home, where they obtain their food by diving and pursuing fishes; and their plumage, in adaptation to these conditions, is exceedingly dense and lustrous, and the skins are extensively utilized by the Eskimo in the making of light clothing. The colors are usually black, brown, or dark lead color above, and white beneath, but in the nuptial season bright colors and a variety of ornamental crests, plumes, and appendages to the bill appear temporarily. The bill in the auks (especially the puffins) is exceedingly compressed, and often has a knife-like culmen, and deep, thin under mandible. An interesting feature of this extraordinary kind of beak is that, in the breeding season, among the puffin group of the family, the beak becomes considerably increased in size, and various appendages may be added about its base, varying with the species, while it glows with bright colors; but as the season passes, and the semi-annual molt of feathers begins, these excrescences and the plates about the base scale off, and the gay colors disappear. Consult Stejneger, *Bulletin United States Nat. Museum*, No. 29, illustrated (1885); and *Harriman Alaska Expedition*, vol. ii (New York, 1902).

Auks migrate in autumn from their most northerly haunts and from all frozen coasts to the open spaces of sea, where they spend the winter afloat or on the drifting ice. With the opening of spring they resort in enormous numbers to the coasts of the northern oceans wherever rocky cliffs confront the sea; and they take possession of niches and ledges as breeding places, sometimes in tens of thousands, each affectionate pair preëmpting and defending a little home space. Only a single egg is laid, which is large for the size of the bird, conical in outline, and is constantly watched and warmed by the parents alternately. No nest whatever is made, but the egg is held upon the webbed feet and kept warm between the thighs. (Selous, *Bird Watching*, London, 1901.) These eggs are marbled and blotched with a great variety of colors. Accounts differ as to how the young get down to the water, and it is probable that various methods of carrying are employed, while some seem simply to throw themselves or be tumbled off the ledge into the sea. Foxes and various animals raid these hosts wherever accessible, and the natives of the Arctic regions depend largely upon them for food, securing both birds and eggs in great numbers and preserving them for winter food. Similarly the eggs are considered an important resource of the non-civilized inhabitants of the Aleutian and Kamtchatkan coasts, southern Greenland, and the Hebrides. Three species of the North Atlantic deserve particular mention:

The GREAT AUK, or Garefowl (*Plautus impennis*), which is now extinct, but within historic times was an inhabitant of the North Atlantic coasts as far south as the Hebrides and the Gulf of Newfoundland. It was as large as a goose, and black and white in colors. It is fully described under EXTINCT ANIMALS and GAREFOWL, and is illustrated on the Plate of AUK, ALBATROSS, ETC. Consult Grieve, *The Great Auk* (London, 1885).

The LITTLE AUK (*Alca* or *Alle alle*) is the smallest of the tribe, not larger than a robin, black above and white beneath, and occurs in vast numbers throughout the Atlantic Arctic region, and southward in winter sometimes as far as New York and the Great Lakes. See DOVEKIE.

The RAZOR-BILLED AUK (*Alca torda*) is 15 to 18 inches in length, black and white (in summer head and neck snuff-brown), has a bill of remarkable height and sharpness, and breeds as far south as the coast of New Brunswick. See RAZOR-BILL; GUILLEMOT; PUFFIN.

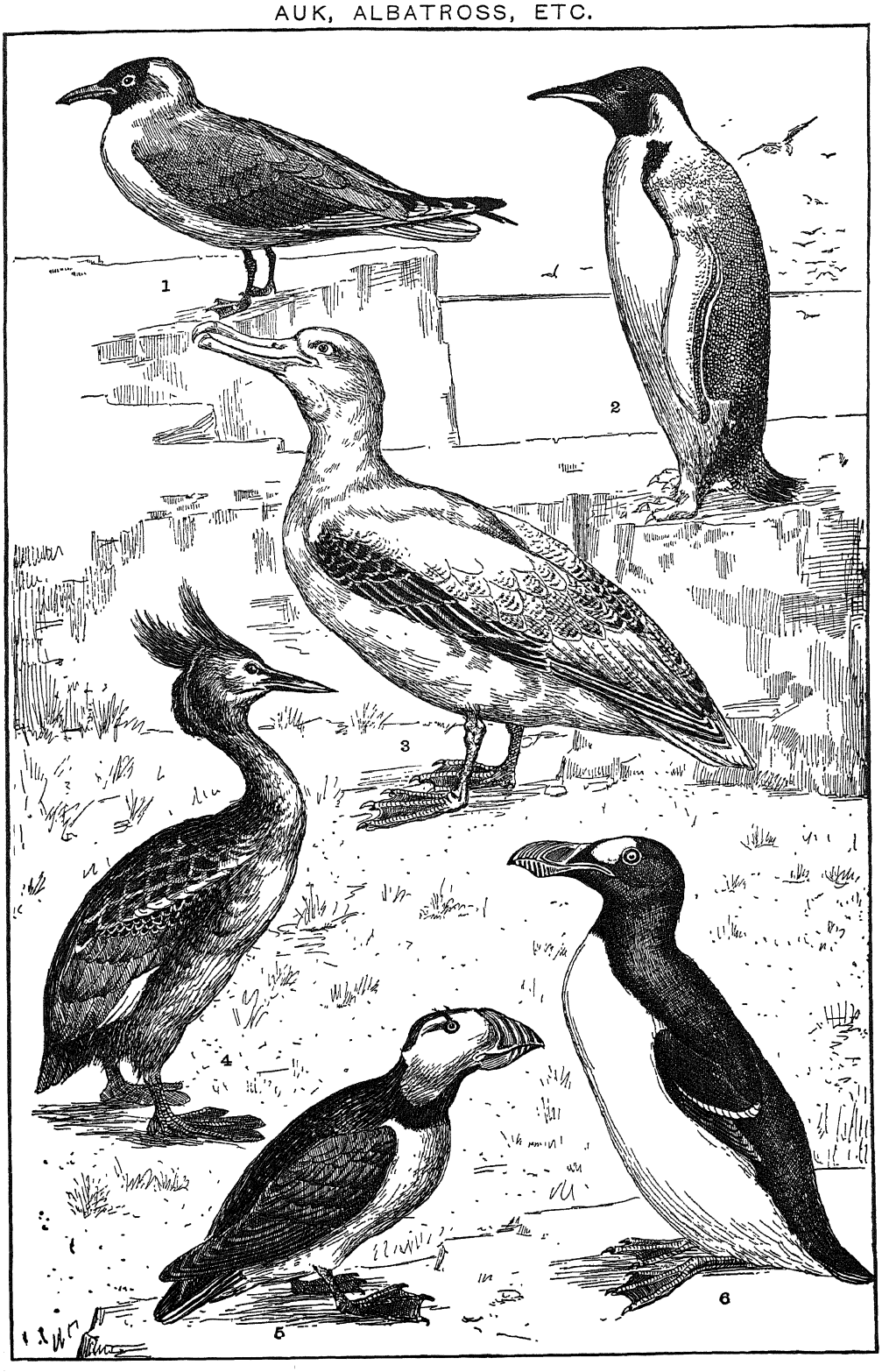
**AULARD**, ō'lär' (FRANÇOIS VICTOR) ALPHONSE (1849—). A French historian born at Montbron (Charente). In 1886 he was appointed to the newly established chair of history of the French Revolution at the Sorbonne. He served as president of the *Commission supérieure des Archives;* of the *Société de l'histoire de la Révolution*, and of the *Mission laïque française*. In his earlier years Aulard was professor in numerous lycées and faculties of letters throughout France. He wrote: *Les orateurs de l'assemblée constituante* (1882); *Les orateurs de la législative et de la convention* (1885); *Le culte de la raison et le culte de l'être suprême, 1793–1794; Essai historique* (1892); *Etudes et leçons sur la révolution française* (1893–97); *Paris pendant la réaction thermidorienne et sous le Directoire* (1898–1902); *Paris sous le consulat* (1903–04). He edited *La société des Jacobins* (6 vols., 1889–97) and *Recueil des actes du comité de salut public* (after 1890). Later works and those undated include: *Histoire politique de la révolution française, origines et développement de la démocratie et de la république, 1784–1804* (1901); *La révolution française et les congrégations: exposé historique et documents* (1903); *Taine, historien de la révolution française* (2d ed., 1908); *Napoléon Ier et le monopole universitaire: origines et fonctionnement de l'université impériale* (1911); *Danton* (a monograph in the *Collection Picard*); with L. M. M. A. Debidour, *Notions d'histoire générale et histoire de France depuis l'antiquité jusqu'à nos jours*, and *Polemique et histoire*. In 1913 was published the seventh series of *Etudes et leçons sur la révolution française*.

**AULD LANG SYNE**, ąld lâng sīn (Scottish, old long since). A Scottish popular song, corresponding to the National Anthem of England or our own "America." Songs bearing this name have been known since the seventeenth century. The newest version, the one most commonly sung nowadays, has but little in common with its numerous earlier prototypes. Musical historians have not yet agreed upon either the authorship of the verse or the composer of the tune. The former is generally attributed to Robert Burns (who, however, credits it to an old minstrel); the latter has very many claimants, among them one George Thomson, who included it in a collection of Scottish airs published in 1799. This was the first time the song was fitted to what are believed to be Burns's words. Consult *Grove's Dictionary of Music and Musicians* (New York, 1910).

**AULD REEKIE** (Old Smokey). 1. A name given by the Scotch to Edinburgh. 2. A Scottish nickname for the devil.

**AULD ROBIN GRAY.** A pathetic ballad, published anonymously in 1772, by Lady Anne

# AUK, ALBATROSS, ETC.




1. BLACK-HEADED GULL (Larus ridibundus).
2. KING PENGUIN (Aptenodytes longirostris).
3. WANDERING ALBATROSS (Diomedea exulans).
4. CRESTED GREBE (Colymbus cristatus).
5. TUFTED PUFFIN (Lunda cirrhata).
6. GREAT AUK, OR GAREFOWL (Plautus impennis).

Barnard, who had written it two years before, in her twenty-first year, but who did not acknowledge it until two years before her death, in 1825. She afterward wrote a sequel to the ballad, in which "Auld Robin" dies, Jamie returns from the sea, and the two lovers are happily united. The characters in the ballad are said to have been real persons. "Auld Robin" was a Scottish shepherd, and "Jamie" was Sir James Bland Burges, who wished to marry Lady Margaret Lindsay, a sister of Lady Barnard. The author's original purpose in writing the ballad is said to have been to raise money for an old nurse.

**AU'LIC COUN'CIL** (Lat. *aulicus*, Gk. *αὐλικός*, *aulikos*, from Gk. *αὐλή*, *aulē*, hall court). One of the two highest courts of the Holy Roman Empire, coördinate with the Imperial Chamber. Originating during the later Middle Ages as a paid Council of the Emperor, it was organized in its later form by Maximilian I in 1497, as a rival to the Imperial Chamber, which the Diet had forced upon him. It seems to have been at first employed principally in preparing business matters regarding the crownlands and the Empire generally, in order to expedite the decisions of the Imperial Chamber. It soon, however, began to assume or acquire higher functions. Later, the states submitted important grievances to its independent consideration; but it did not receive a fixed constitution before 1559. At the Peace of Westphalia, 1648, its powers were greatly limited, but in 1654 it was formally recognized as the second of the two supreme courts, equal in dignity to the Imperial Chamber, and the highest court of appeals in the Empire. It was composed of a president, a vice-president, a vice-chancellor, and 18 councilors, who were all chosen and paid by the Emperor, with the exception of the vice-chancellor, who was appointed by the Elector of Mainz. Of the 18 councilors, six were Protestants, whose votes, when they were unanimous, were an effective veto, so that a religious parity was to some extent preserved. The councilors were divided into two classes, barons and counts, and jurists. The seat of the Aulic Council was at the Imperial residence, i.e., at Vienna. The Council held aloof from politics, but under its jurisdiction were placed: (1) all matters concerning the reserved rights of the Emperor; (2) all questions of appeal on the part of the states from decisions in favor of the Emperor in minor courts; (3) whatever concerned the Imperial jurisdiction in Italy. On the death of the Emperor the Council was dissolved and had to be reconstructed by his successor. It ceased to exist on the extinction of the Holy Roman Empire in 1806. Consult Herschenhahn, *Geschichte des kaiserlichen Reichshofraths* (Mannheim, 1791–93).

**AULICH**, ou'lĭk, Ludwig (1792–1849). A Hungarian general, born at Pressburg. Upon the outbreak of the Hungarian Revolution of 1848 he served as lieutenant-colonel in an Austrian infantry regiment, which afterward swore allegiance to Hungary. As colonel of the regiment he fought against the Servians at St. Tamás, allied with the Austrian army under Schwarzenberg. As general of the Second Hungarian Army Corps he contributed greatly to the victories achieved over Prince Windischgrätz and was received in Pesth as the hero of the day. Upon the resignation of Görgei he became Minister of War, but was delivered over to Austria by the Russians upon the conclusion of peace, and was hanged with 12 other generals.

**AU'LIS** (Gk. *Αὐλίς*). Anciently, a small port in Bœotia, on the Euripus, famed for its temple of Artemis, but in itself a place of little importance. It was the traditional gathering place of the Greek fleet before the Trojan War and was the scene of the sacrifice of Iphigenia (q.v.).

**AULNAY DE CHARNISÉ**, ô'nâ' de shär'nē'zā'. See Charnisé.

**AULNOY**, or **AUNOY**, ô'nwä', Marie Catherine, Comtesse d' (1650–1705). A French author, chiefly remembered for her *Contes des fées*, popular fairy tales (1698), in successful imitation of Perrault. Many of the stories have been translated into English. She wrote also *Mémoires de la cour d'Espagne* (1690), and several novels, of which *Histoire d'Hippolyte, Comte de Douglas* (1690), is the best.

**AULON.** The Greek name for Avlona. See Valona.

**AULOS.** A Greek wind instrument similar to the clarinet and oboe (qq.v.).

**AULYE-ATA**, or **AULIÉ-ATA**, ou'lyâ ä'tâ. The chief town of a district, and fortress in the territory of Syr-Darya, Russian Turkestan, on the Talas River. The town is picturesquely situated in a hilly region, 5700 feet above the sea, on the way from Tashkent to Verniy. Fruit raising is the chief industry, and there is trade in leather, cattle, and horses. Pop., 12,000, including a considerable number of Russians.

**AUMALE**, ô'mâl' (through *Aubmarle*, *aubemarle*, Eng. *Albemarle*, from ML. *Albamarla*, white marl, clay). A town in France, 37 miles northeast of Rouen (Map: France, N., G 3). Here, in 1592, in a battle between the Spaniards and French, Henry of Navarre was wounded. Pop., in 1911, 2412. Consult Semichon, *Histoire de la ville d'Aumale* (Paris, 1862). The manufacture of glass and steel is the chief occupation of the modern town. Aumale was the name of a county in the early part of the sixteenth century, belonging to Claude of Lorraine, son of René II. Claude was created Duc de Guise and became the head of that famous house.

**AUMALE**, Charles de Lorraine, Duc d' (1556–1631). An ardent partisan of the League in the politico-religious wars which devastated France in the latter half of the sixteenth century. After the murder of his uncle, the Duc de Guise at Blois, in 1588, he divided with the Duc de Mayenne the leadership of the League. He was defeated at Senlis by the Duc de Longueville and shared in the disasters of Arques (1589) and Ivry (1590). He held out for the League in Amiens until the populace expelled him; when he suddenly allied himself with the Spaniards, who had invaded Picardy, refused the royal pardon, and delivered over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel (1595). His property was confiscated, but he himself escaped. He died in exile at Brussels.

**AUMALE**, Claude I, de Lorraine, Duc d' (d.1550). The son of René II, Duc de Lorraine. For his bravery at the battle of Marignano, in 1515, and his loyalty after the disaster at Pavia, Francis I made him Duc de Guise.

**AUMALE**, Claude II, de Lorraine, Duc d' (1525–73). A son of Claude I. He was a bitter enemy of the Huguenots and of their leader,

Coligny. He acted as Governor of Burgundy, fought at Metz in 1552, was present with Guise at the taking of Calais in 1558, and participated in the battles of Dreux, Saint-Denis, and Montcontour during the Civil War. He was killed at the siege of La Rochelle in 1573.

**AUMALE,** HENRI EUGÉNE-PHILIPPE, LOUIS D'ORLÉANS, DUC D' (1822–97). The fourth son of Louis Philippe, King of the French. He was born at Paris and was educated at the Collège Henri IV, where he showed a good deal of talent. When 17 years of age he entered the army, soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. In 1843 he commanded a subdivision of the French army in Algeria and performed some brilliant exploits in his campaign against the famous Abd-el-Kader. In 1844 he directed the expedition against Biskra and in 1847 succeeded Marshal Bugeaud as Governor-General of Algeria, in which capacity he received the surrender of Abd-el-Kader. After the Revolution of 1848 he resigned and withdrew to England, where he devoted himself to literature. On the outbreak of the Franco-German War he was refused permission to serve in the French army, but in February, 1871, was chosen a member of the Assembly by the electors of the department of Oise and in December took his seat, the members of his family having been allowed to return to France. In 1873 he was made general of division and presided over the council of war that tried Marshal Bazaine. He subsequently held other military commands, but in 1886, on the passage of the Expulsion Bill, he was debarred from the army and withdrew to England. Not long after this it was learned that he had given the Château of Chantilly, with its magnificent collections, to the Institute of France, of which he had been a member in 1871, the Institute to hold the bequest in trust for the French nation. The decree of banishment was revoked in 1889. He died, May 7, 1897, at Zucco, in Sicily. His wife, Marie Caroline Auguste de Bourbon, daughter of Leopold, Prince of Salerno, whom he married in 1844, died in 1869, and in 1866 and 1872 he lost his two sons. Two volumes of his *Histoire des Princes de Condé* were published in 1869. His pamphlet, *Lettre sur l'histoire de France* (April, 1861), excited a sensation by its attacks upon Napoleon III and Prince Napoleon. Among other publications is his *Les institutions militaires de la France* (1867).

**AUNE,** ōn. The French cloth measure corresponding to the English *ell*. Both words are derived from the Lat. *ulna*. The English ell = 1¼ yards = 45 inches; the French *aune usuelle* (or *nouvelle*) = 1⅛ meters = 47¼ inches English. The old *aune* was a little shorter.

**AUN'GERVILLE,** RICHARD. See BURY, RICHARD DE.

**AUNOY,** COUNTESS D'. See AULNOY.

**AUNT PHIL'LIS'S CAB'IN.** A story by Mary H. Eastman (1852), a reply to *Uncle Tom's Cabin*.

**AURA** (Lat., Gr. *αὔρα, aura,* air, breeze). A term anciently used to denote an ethereal vapor emanating from volatile substances; literally, "aura" signifies a vapor or emanation from a body which it surrounds like an atmosphere. Pelox first used the term over 20 centuries ago in connection with epilepsy, because he believed the paroxysm began as a "spirituous vapor in the veins of the extremities and ascended to the head," thus producing unconsciousness. The spiritualists apply the word to a supposed mysterious light associated with the presence of a spirit form. In electricity "aura" means 'the air current caused by the discharge of an electric spark.' Medically the *aura epileptica* is a curious and often indescribable sensation which at times precedes an epileptic seizure. The most common manifestation is that of an indefinable sensation beginning at the pit of the stomach and rising to the head,—the epigastric aura. Instead of this the aura may take the form of roaring in the ears, flashes of light before the eyes, or a bitter or metallic taste in the mouth. In a few epileptics the aura assumes the character of a brief state of mental exaltation. See EPILEPSY.

**AURAM'IN.** See COAL-TAR COLORS.

**AURANGABAD,** ou-rŭn'gȧ-bȧd' (*Aurungzebe* + Hind., Pers. *abad,* abode, dwelling, town). A city of Hyderabad, India, on the Dudna, an affluent of the Godavari, 234 miles east of Bombay by rail and 67 miles northeast of Ahmednagar (Map: India, C 5). It has a considerable trade in grain, and mills cotton. Its notable monuments comprise the great mosque, the mausoleum of Aurungzebe's wife, and the ruins of the palace or citadel. The five sculptured caves of Ajanta are in the district of Aurangabad. The city was founded in 1620; under Aurungzebe it became the capital of the Deccan and a city of great importance. After the transference of the capital to Hyderabad its importance declined, and its population has decreased from 100,000 to less than 25,000.

**AURANGZIB.** See AURUNGZEBE.

**AURAN'TIA,** ą-răn'shĭ-ȧ. See COAL-TAR COLORS.

**AU'RATES.** The salts of auric acid (q.v.).

**AURELIAN,** WALL OF. A massive wall begun by Aurelian in 271 A.D. as a defense against the barbarians, and completed under Probus in 280. It was repaired and strengthened by gate towers built over a century later under Arcadius and Honorius. It was about 54 feet in height and over 12 miles long. The wall was built in great haste and includes the remains of buildings and garden walls, some with statues in their original niches. This method of construction has made possible the recovery of a number of statues and frescoes on the walls of houses filled in instead of being demolished in the hurry of building. Existing structures such as the strong supporting wall built round the Horti Aciliorum on the Pincian Hill, aqueduct arches, and tombs, such as the well-known Pyramid of Cestius, were incorporated in the wall. A covered way near the base of the wall is provided with loopholes toward the outer side and an arcade on the inner side. Towers to the number of 381 were connected with this passage and with the battlements above; the passage ran all around the wall, to facilitate the movement of troops. The course of the wall followed the line of octroi, or customs barrier. A large part of the wall is still in a more or less perfect state of preservation, but all traces of its course along and beyond the Tiber have disappeared. Much has been learned from a study of the stamped bricks used in the construction of this wall (see *Supplementary Papers of the American School of Classical Studies in Rome,* vol. i). Consult Lanciani, *Ruins and Excavations of Ancient Rome* (Boston, 1897), and Platner's *Topography and Monuments of Ancient Rome* (Boston, 1911).

**AURE'LIA'NUS,** LUCIUS DOMITIUS (c.212–275 A.D.). One of the most powerful of the later Roman emperors. He was of humble origin. Enlisting early as a common soldier, he rapidly distinguished himself and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (270 A.D.) Aurelianus was elected Emperor by the army. He began his reign by continuing the war with the Goths which Claudius had begun; he drove them across the Danube. This success he followed by vigorous and successful opposition to the barbarian Iuthungi and Allemanni, whom he expelled. Thereafter he commenced the erection of a new line of fortified walls around Rome, which were not completed till the reign of Probus (276). Their ruins still mark the boundaries of Rome in the time of Aurelian. Finding that the province of Dacia (now Transylvania and Wallachia) could not be maintained against the assaults of the Goths, he surrendered it, on certain conditions, and strengthened the frontier of the Roman Empire by making the Danube its boundary. He next turned his attention to the East, where the renowned Queen of Palmyra, Zenobia (q.v.), had extended her sway from Syria to Asia Minor and Egypt. Aurelianus defeated her in two battles and besieged her in Palmyra, from which she attempted to escape when she saw defiance would prove unavailing. She was, however, taken prisoner. Soon afterward the city surrendered and was treated leniently. Shortly after Aurelianus had departed, a new insurrection took place. He returned in 273 and gave the splendid city up to destruction. Aurelianus was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of Seleucia, of great influence, whom he speedily overthrew. In 274 Tetricus, who had held imperial power in Gaul since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelianus. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, Aurelianus merited the title awarded to him by the Senate, "Restorer of the Roman Empire." He fell as the victim of a conspiracy among his officials during his campaign against the Persians (275). His life by Vopiscus forms part of the Augustan history (q.v.). (See AURELIAN, WALL OF.) Consult L. Homs, *Le règne de l'empereur Aurelien* (1904), and *The Cambridge Mediæval History,* vol. i (New York, 1911).

**AURELIAN WAY.** A military road leading from Rome along the coast to Pisa, extended in 109 B.C. to Genoa and under Augustus into Gaul.

**AURE'LIUS,** MARCUS, surnamed ANTONINUS (121–180 A.D.). A Roman Emperor. He was born at Rome, April 21, 121, the son of Annius Verus and Domitia Calvilla. His original name was Marcus Annius Verus. On his father's death he was adopted by his grandfather, who spared no pains to render him preëminent in every art and science. His fine qualities early attracted the notice of the Emperor Hadrian, who used to term him not *Verus,* but *Verissimus,* and who conferred high honors on him, even while he was yet a child. When only 17 years of age, he was adopted, with Lucius Ceionius Commodus Verus (commonly known as Lucius Verus), by Antoninus Pius, the successor of Hadrian; and Faustina, the daughter of Antoninus, was selected for his wife. His name henceforth was Marcus Ælius Aurelius Antoninus (Ælius he derived from Hadrian's family; Aurelius was the original name of Antoninus Pius). In the year 140 he was made consul; and from this period to the death of Antoninus, in 161, he continued to discharge the duties of his various offices with the greatest promptitude and fidelity. The relation which subsisted between him and the Emperor was of the warmest and most familiar kind. On his accession to the throne he strikingly illustrated the magnanimity of his character by voluntarily sharing the government (which Antoninus had left, in his last moments, and the Senate offered, to him alone) with young Lucius Verus, to whom Aurelius gave his daughter Lucilla in marriage. Toward the close of 161 the Parthian War broke out, and Lucius was sent to the frontiers of the Empire to repel the incursions of the barbarians; but, intoxicated with the enervating pleasures of the East, he obstinately refused to go beyond Antioch, and intrusted the command of the army to his lieutenant, Avidius Cassius, who gained several brilliant victories. Lucius returned to Rome in 166 and enjoyed a triumph to which he had no real claim; for all the great achievements of the war were accomplished by his officers, while he was reveling in the most extravagant licentiousness.

In the meantime Marcus Aurelius had distinguished himself by the prudence and energy with which he administered affairs at home. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Chatti (Hessians) were waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself raged a pestilence, believed to have been brought home by the troops of Lucius; frightful inundations and earthquakes had laid large portions of the city in ruins, destroyed the granaries, and thus created almost universal distress, which stimulated to an incalculable degree the terror which the citizens entertained of their savage enemies. To allay the popular perturbation, Marcus resolved to go forth to the war himself. Hecatombs were offered to the offended gods, and the Roman legions set out for the north. Marcus and Lucius were, for the time, completely successful. The pride of the Marcomanni and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube was humbled, and they were compelled to sue for peace in 168; in the following year Lucius died. The contest was renewed in 170 and may be said to have continued with intermissions during the whole life of the Emperor. Although fond of peace, both from natural disposition and philosophic culture, he displayed the sternest rigor in suppressing the revolts of the barbarians; but, in order to accomplish this, he had to enroll among his soldiery vast numbers of gladiators and slaves, for his army had been thinned by the ravages of the plague. His headquarters were Pannonia, out of which he drove the Marcomanni, whom he subsequently all but annihilated as they were crossing the Danube. The same fate befell the Iazyges; but the most famous as well as the most extraordinary of all his victories was the miraculous one which he gained over the Quadi (174), and which gave rise to copious discussion among Christian historians and others. Dio Cassius's account is that the Romans were perishing of thirst in the heat of summer, when

suddenly the cloudless sky darkened and abundant showers fell; as the soldiers were taking advantage of the water thus unexpectedly supplied to them, the barbarians attacked them and would have cut them to pieces, had not the barbarians themselves, bewildered by a storm of hail and fire, been vanquished by the Romans. That some extraordinary phenomenon occurred is evident, for there is a letter of Aurelius still extant in which he commemorates the event; and he was a man incapable of uttering a falsehood, not to mention that there was an entire army living to disprove the statement if untrue. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission and obtain clemency; but the practical advantages that might have resulted from this were nullified by a new outbreak in the East. Though suffering from failing health, he was obliged to leave Pannonia. Before long, however, he learned that Avidius Cassius, who had rebelled against him in Asia and had seized the whole of Asia Minor, had perished by assassination. The conduct of Marcus Aurelius on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. Like Cæsar in similar circumstances, but in a more purely humane spirit, he received the head of his murdered adversary with feelings quite opposite to what had been anticipated, rejecting the bloody gift with all the loathing of a benevolent nature and even shrinking from the presence of the murderers. On his arrival in the East he exhibited the same remarkable magnanimity. He burned the papers of Cassius without reading them, so that he might not be at liberty to suspect any as traitors; treated with extreme gentleness the provinces which had rebelled; disarmed the enmity and dispelled the fears of the nobles who had openly favored his insurgent lieutenant. While he was pursuing his work of restoring tranquillity, Faustina died in an obscure village at the foot of Mount Taurus; he paid the most lavish honors to her memory. Dio Cassius and Capitolinus charge her with gross infidelity and various crimes and blame Aurelius for giving no heed to her wrongdoing.

On his way home he visited lower Egypt and Greece, displaying everywhere the noblest solicitude for the welfare of his vast Empire, and drawing forth from his subjects, who were astonished at his goodness, sentiments of the profoundest admiration and regard. At Athens, which this Imperial pagan philosopher must have venerated as a pious Jew did the city of Jerusalem, he showed a catholicity of intellect by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever labored more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Toward the close of the year 176 he reached Italy and celebrated his merciful and bloodless triumph on December 23. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. He was again successful in several sanguinary engagements; but his originally weak constitution, shattered by perpetual anxiety and fatigue, at length failed, and he died, either at Vienna or at Sirmium, on March 17, 180, after a reign of 20 years. In his honor his son Commodus erected the Antonine Column (q.v.).

Marcus Aurelius was the flower of the Stoic philosophy. It seems almost inexplicable that so harsh and crabbed a system should have produced as pure and gentle an example of humanity as the records of pagan history can show. Perhaps, as a modern philosophic theologian suggests, it was because Stoicism was the most solid and practical of the philosophic theories, and the one which most earnestly opposed itself to the rapidly increasing licentiousness of the time, that the chaste heart of the youth was drawn toward it. At 12 years of age he avowed himself a follower of Zeno and Epicetus. Stoics were his teachers—Diognotus, Apollonius, and Junius Rusticus; and he himself is to be considered one of the most thoughtful teachers of the school. Oratory he studied under Atticus Herodes and Cornelius Fronto. With Fronto he long corresponded. His love of learning was insatiable. Even after he had attained the highest dignity of the State, he did not disdain to attend the school of Sextus of Chæronea. Men of letters were his most intimate friends and received the highest honors, both when alive and dead. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. Nor must we forget that these were cultivated not merely in the springtime of his life, when enthusiasm was strong and experience had not saddened his thoughts and when study was his only labor, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an Empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained, uncorrupted to the end of his life, his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, Roman citizens everywhere, and many others in distant portions of the Empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship and was believed to appear in dreams, like the saints of subsequent Christian ages.

There is one feature in his character, however, which it would be dishonest to pass over —his hostility to Christianity. He was a persecutor of the new religion, and, it is clearly demonstrated, was cognizant, to a certain extent at least, of the atrocities perpetrated upon its followers. Numerous explanations have been offered of his conduct in this matter. The most popular one is that he for once allowed himself to be led away by evil counselors; but a deeper reason is to be found in that very earnestness with which he clung to the old heathen faith of his ancestors. He believed it to be true and to be the parent of those philosophies which had sprung out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition and a mysterious political conspiracy, was secretly spreading throughout the Empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was, therefore, compara



**MARCUS AURELIUS**

FROM THE BUST IN THE BERLIN MUSEUM

tively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. John Stuart Mill finds in this tragic error of the great Emperor a most striking warning against the danger of interfering with the liberty of thought.

In 177 Aurelius published his first edict against the Christians, and the persecution lasted during this and the following year. The aged Polycarp was burned at the stake at Smyrna, and St. Cecilia was martyred at Rome (Sept. 16, 178), while large numbers perished in the furious persecution at Lugdunum (Lyons), in Gaul. Athenagoras of Athens, a Christian philosopher, addressed to the Emperor a defense (*Apologia*) of the Christians, still extant, which did not avail to check the martyrdom.

Aurelius was the author of a beautiful ethical work, known now as the *Meditations*, though Aurelian himself gave it a different name. It is written in Greek, and is the finest product of the Stoic philosophy. The work is not a systematic treatise, but a series of communings, worked out at widely different times, amid public business or when battles were imminent. It has been edited by Stich (Leipzig, 1903); translated by Long (London, 1862, 1900), Rendall (London, 1897), and (in selections) by Smith (London, 1899). Consult: Watson, *M. Aurelius Antoninus* (1884); Farrar, *Seekers after God* (London, 1868); Renan, *Marc-Aurèle* (Paris, 1881; translated, London, 1888); Dill, *Roman Society from Nero to Marcus Aurelius* (London, 1904); E. Vernon Arnold, *Roman Stoicism* (London, 1911). For the correspondence with Fronto, consult Robinson Ellis, *Correspondence of Fronto and Marcus Aurelius* (Oxford, 1904), and M. Dorothy Brock, *Studies in Fronto and his Age* (Cambridge, 1911).

**AURELIUS,** MARCUS, STATUE OF. A fine bronze equestrian statue in Rome, which, during the Middle Ages, stood near the Lateran, and was removed in 1538 to its present commanding position on the Capitoline Hill. Its preservation is probably due to the fact that it was popularly believed to be the statue of Constantine, the first Christian Emperor. In 1347, when Rienzi was chosen to the tribuneship, wine and water were caused to flow from the nostrils of the horse. The pedestal is the work of Michelangelo, and was cut from a column of the temple of Castor and Pollux.

**AURELIUS VICTOR,** SEXTUS (fl.360 A.D.). A Roman historian. He wrote *De Cæsaribus*, a collection of brief biographies of the emperors from Augustus to Constantius. According to his own account, contained in that work, he was appointed by Julian Governor of a division of the province of Pannonia, and, by Theodosius, city prefect. He is also generally identified as the Aurelius Victor who was Consul with Valentinian, 373.

**AURELLE DE PALADINES,** ō'rĕl' de pà'-là'dēn', LOUIS JEAN BAPTISTE D' (1804–77). A French general. He entered the army in 1824, served in Algiers in 1841–48, won distinction in the Crimean War, and became a general of division in 1855. He was not in active service at the outbreak of the Franco-German War, but received a command after the battle of Sedan, organized the Army of the Loire, and drove Von der Tann-Rathsamhausen from Orleans, winning the first victory for France. He was repulsed in an attack upon the army of Prince Frederick Charles, was beaten by the Grand Duke of Mecklenburg at Artenay, and was soon afterward removed from his command, though he subsequently commanded the National Guard in the department of the Seine. He was chosen a member of the National Assembly after the armistice and in 1875 was elected a life Senator. He wrote *Campagne de 1870–71; la première armée de la Loire* (1872).

**AU'REOLE** (Lat. *aureola*, golden, sc. *corona*, crown). The glory which radiates from the body of a transfigured, divine, or other supernatural being in representations of Christian art. It differs from the nimbus (q.v.), which radiates from the head only, in being an emanation of light from the entire body. It is of various shapes—circular, oval, or egg-shaped, quadrilobed and lozenged. Sometimes, as in enthroned figures of Christ, there is a double aureole—one around the upper, and the other around the lower part of the body. The aureole is of two kinds; circumscribed or diffused, according as the rays of light, as they flare outward, end in an encircling band or melt into space. These rays are sometimes straight, sometimes flamboyant. The aureole was of later origin than the nimbus; it was not used until after the eighth century and was generally abandoned by Renaissance painters of the fifteenth century. It was used almost exclusively around figures of Christ, the Trinity, and the Virgin Mary.

**AUREUS,** ą'rē-ŭs, or DENARIUS AUREUS (Lat. golden, from *aurum*, gold). The oldest standard gold coin of Rome, first coined 207 B.C. Its weight varied from 1-30 to 1-72 of a pound, but its average weight was 121 grains, and its value about $5.00. Consult G. F. Hill, *A Handbook of Greek and Roman Coins* (London, 1899). See NUMISMATICS, *Roman Coins*.

**AU'RIC AC'ID** (Lat. *aurum*, gold). A name formerly given to gold peroxide, a brown-black powder which is obtained by precipitating the auric chloride with alkalies. It combines with basic radicals to form salts, which are called *aurates*, as ammonium aurate, which is the scientific name for fulminating gold.

**AU'RICHAL'CITE.** A carbonate of calcium and copper, occurring in powdery crusts of a light-blue to greenish-blue color, usually on malachite and azurite (q.v.), of which it is an alteration product. It is found at Chessy, France, in the Clifton district of Arizona, and in the province of Sonora, Mexico.

**AU'RICLES** (Lat. *auricula*, dimin. of *auris*, ear). Two cavities of the heart. See CIRCULATION.

**AURIC'ULA** (Lat. dim. of *auris*, ear, so named on account of a fancied resemblance of the leaves to the ears of an animal), *Primula auricula*. A plant of the same genus with the primrose, little grown in America, but valued in England for the fragrance and beauty of its flowers. The auricula is a native of the Alps and other mountains of the middle and south of Europe and sub-alpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria. It grows in shady and moist places. In the wild state it has comparatively small flowers, of a simple yellow color, on short stalks, forming an umbel. It has been greatly improved by cultivation. Red, pink, crimson, apple-green, and mulberry are the chief colors which the different varieties exhibit. More than 1200 varieties have been cultivated, and new ones are from time to time raised from

seed. Some of them are entirely of one color, others of two or more; some are delicately shaded, and some variegated. The flowers of desirable varieties are large and almost round, with the white or yellow eye of the centre distinct, and its color does not mix with the ground color. The scape must be tall, and the full umbel of erect flowers rise entirely above the leaves. The green margin adds much to the beauty of many varieties. The auricula blooms in April and May, and often also a second time at the end of autumn. It succeeds best in a rich, light soil. The finer varieties are cultivated in pots. They ought, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August. When auricula is to be raised from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air. They ought to be protected from heavy rains by hand-glasses placed over them. The seed is sown either in autumn or spring, usually in boxes placed under shelter or in a slight hotbed.

**AURICULAR CONFES'SION.** See CONFESSION.

**AU'RIFA'BER** (Lat. for family name Goldschmied). German Protestant theologians and reformers.—1. ANDREAS (1514–59). A friend of Melanchthon; born in Breslau. He received the degree of M.A. at Wittenberg University in 1534. He taught in the philosophical faculty; then was school principal. He took up medicine and was body physician to Duke Albert of Prussia for 10 years. In 1542 he returned as professor of medicine to Wittenberg and after 1545 was ducal body physician at Königsberg and professor in the university, although his instruction was much interrupted by the diplomatic journeys on which he was sent by the Duke. He was an ardent defender of Osiande (q.v.) (1498–1552), whose daughter was his second wife. As an Osianderian he was bitterly attacked by the ultra-conservative Lutherans, whose leader (Flacius) dubbed him "dog-doctor," because he had issued a book upon the treatment of canine diseases. He died at Königsberg, Dec. 12, 1559. His writings were chiefly medical.—2. JOHANNES (1517–68). A brother of Andreas, and, like him, a friend of Melanchthon; born at Breslau, Jan. 30, 1517. He received the degree of M.A. at Wittenberg University in 1538 and became professor at Rostock in 1550. After a varied and fruitful activity (chief author of the Mecklenburg Church Ordinances, 1551), he became professor of theology at Königsberg in 1554, resigned in 1565, and died at Breslau, Oct. 19, 1568. He also was involved in the Osiander strife which wrought up the theologians of that time.—3. JOHANNES (c.1519–75). A zealous friend of Luther; born in the county of Mansfeld, Saxony, and educated at Wittenberg. He became tutor to the young Count Mansfeld and in the war of 1544 was with the army as chaplain. He lived with Luther as his secretary (1545) and was present at Luther's death, Feb. 18, 1546. He was a furious critic of Melanchthon. After being for some years court preacher at Weimar, he was compelled to flee to Eisleben (1561), and there began those Lutheran publications which have given him fame. In 1566 he was appointed minister of the Lutheran church at Erfurt, holding the place until his death, Nov. 18, 1575. He began, in 1540, collecting Lutheran MSS., and by 1553 had 2000 letters of Luther's; the same year he shared in the 12-volume German and Latin edition of Luther which appeared in Jena in 1556. He issued two volumes of Luther's letters (1556–65); also a supplement to the Jena edition and the *Works* in 1564–65 (2 vols.). In 1566 he issued his famous *Tischreren und Colloquia Dr. M. Luthers.*

**AURI'GA** (Lat. *auriga*, charioteer, driver), or THE WAGONER. A northern constellation lying immediately to the east of Perseus. Its chief ornament is $\alpha$ Aurigæ or Capella (q.v.), a star of the first magnitude. On Feb. 1, 1892, a remarkable *nova*, or new star, was discovered in the foot of Auriga by Anderson of Edinburgh, although it had been recorded photographically on negatives taken at Harvard on Dec. 10, 1891, but had remained undetected. At its brightest it showed as a star of about the fourth magnitude, and remained visible to the naked eye for about a month, afterward becoming rapidly invisible. The double character of its spectrum during the early stages led to the hypothesis of a grazing collision between two bodies rushing past each other with the enormous relative velocity of 550 miles per second as the cause of the outburst, but the hypothesis was not substantiated, and it appears more likely that the birth of the star was due to some stupendous explosion. After remaining invisible for nearly four months the star mounted again to the tenth magnitude, but its spectrum was found to have undergone a remarkable change, having become assimilated to the nebular type. It has since reverted to its stellar character and is now of the thirteenth magnitude. The three stars, $\epsilon$, $\zeta$, and $\eta$ Aurigæ, which are situated about 5° southwest of Capella, were known to the ancients as the "Kids." Vergil refers to them as *pluviales Hœdi*, and Horace as *insana sidera*, because their heliacal rising in October was supposed to portend stormy weather.

**AU'RIGNA'CIAN.** See PALEOLITHIC PERIOD.

**AURIGNY**, ō'rē'nyĕ'. See ALDERNEY.

**AURILLAC**, ō'rē'yȧk' (probably from Aurelius, the Roman Emperor). A town of France, capital of the department of Cantal (Auvergne), situated in a pleasant valley on the banks of the Jordanne, about 269 miles south of Paris (Map: France, S., G 4). It is said to owe its origin to a Benedictine monastery founded in the ninth century by St. Géraud. The streets are wide but irregular, and are kept clean by streams supplied by a reservoir and by a canal from the Jordanne. Neighboring quarries supply slate. The principal buildings are the churches of Notre Dame and St. Géraud; the castle of St. Etienne, now occupied by a normal school; the theatre; former college buildings which now contain a small museum; and the grain market. There are monuments to the French philanthropist M. de Montyon and General Delzons. Paper, jewelry, copper utensils, umbrellas, leather, and lime are the chief industrial products. The English, in the fourteenth and fifteenth centuries, often besieged the town, and it was taken and pillaged during the religious wars in the sixteenth century. Pope Sylvester II, whose statue is to be seen at Aurillac, was born there, as was the infamous Carrier of the French Revolution. Pop., 1901, 17,459; 1906, 17,772; 1911, 18,036.

**AU'RIN** (Lat. *aurum*, gold), $C_{19}H_{14}O_8$. A coloring substance used in the manufacture of

lacquers. It is obtained in the form of beautiful green needles, by the action of sulphuric and oxalic acids on carbolic acid at 130°–150° C. Reducing agents transform it into a colorless substance known as leucarin, $C_{19}H_{16}O_3$. Owing to the difficulty of fixing it, it is not much used as a dye, though its solution in alkali has a beautiful fuchsine-red color.

**AURISPA,** ou-rē'spȧ, GIOVANNI (c.1369–1460). A distinguished Italian humanist of the fifteenth century, born at Noto, in Sicily. In 1418 he went to Constantinople for the purpose of learning Greek; after some years he returned to Italy, bringing with him 238 manuscripts of ancient Greek authors, among them Pindar, Callimachus, Æschylus, Sophocles, Plato, and Procopius. On his return he lived at Venice and later held the chair of Greek literature at Bologna. Through Niccolò de' Niccoli he was called to Florence as teacher of Greek, but cut short his stay and soon removed to Ferrara. In 1438 the Greek Emperor, John Palæologus, called him to assist in the council called by Pope Eugene IV, at Basel; the latter made Aurispa his secretary in 1441, which office he held for six years. He died at Ferrara in 1460. Of his many translations the following only have been published: Hierocles' *Liber in Pythagoræ Aurea Carmina, Latinitate Donatus* (Padua, 1474); *Philisci Consolatoria, etc.* (Paris, 1510). Many other translations remain in manuscript in Italian libraries. Consult Voigt, *Die Wiederbelebung des klassischen Alterthums*, vol. i (Berlin, 1893), and Symonds, *Renaissance in Italy*, vol. ii (London, 1877).

**AUROCHS,** ą'rŏks (MHG. *ūrohso*, from *ūr*, AS. *ūr*, Eng. *owre*, wild ox + *ohso*, ox). The European bison or wisent (*Bos bonasus* or *Bison europæus*). The name "aurochs" is also sometimes applied to the urus, the ancient wild ox of Europe (*Bos primigĕnius*), the supposed progenitor of our domestic cattle. See BISON and Plate of BISONS.

**AURO'RA.** A city in Kane Co., Ill., 39 miles west of Chicago, on the Fox River, and on the Chicago and Northwestern, the Chicago, Aurora, and De Kalb, the Chicago, Milwaukee, and Gary, the Elgin, Joliet, and Eastern, the Aurora, Elgin, and Chicago, and the Chicago, Burlington, and Quincy railroads (Map: Illinois, D 2). It is an important manufacturing place, producing extensively carriages and wagons, silver-plated ware, wheel scrapers, motor cycles, grindstones, sashes and blinds, etc. It has also machine shops, smelting works, stove works, brass foundries, cotton mills, and railway repair shops. The city is the seat of Aurora College, has a Carnegie library, and owns and operates its water works and electric light plant. It was settled in 1834 and incorporated in 1837. Under a charter of 1887 the government is vested in a mayor, elected for two years, and a city council. Other officers also are elected by the people. Pop., 1860, 6011; 1890, 19,688; 1900, 24,147; 1910, 29,807; 1920, 36,397.

**AURORA.** A city in Dearborn Co., Ind., 29 miles west by south of Cincinnati, Ohio, on the Cleveland, Cincinnati, Chicago, and St. Louis, and the Baltimore and Ohio Southwestern railroads, and on the Ohio River (Map: Indiana, E 3). It has a public library and an attractive park. The leading manufactures include foundry and machine-shop products, tools, furniture, wheels, barrels, buggies, flour, brick, and coffins. There is a considerable trade in hay, grain, and tobacco. Aurora was settled in 1819 and was chartered as a city in 1848. Pop., 1900, 3645; 1910, 4410.

**AURORA.** A city in Lawrence Co., Mo., 30 miles southwest of Springfield; on the Frisco Lines and the St. Louis, Iron Mountain, and Southern railroads (Map: Missouri, C 5). The principal industries are fruit growing, and lead and zinc mining. There are also foundries, flour mills, publishing houses, marble works, a canning factory, etc. A considerable water power is obtained from dams in the White River. Pop., 1890, 3482; 1900, 6191; 1910, 4148.

**AURORA.** A city, and the county-seat of Hamilton Co., Neb., 110 miles (direct) west by south of Omaha; on the Burlington and Missouri River Railroad (Map: Nebraska, G 3). It is in a farming and stock-raising region and has brick works and flouring mills. The water works are owned by the municipality. Pop., 1890, 1862; 1900, 1921; 1910, 2630.

**AURORA.** A village in Cayuga Co., N. Y., 16 miles by rail southwest of Auburn; on Cayuga Lake, and the Lehigh Valley Railroad (Map: New York, D 5). It is a beautiful residential town, in the centre of a fertile agricultural region, and is the seat of Wells College for Women, founded 1868, Wallcourt, a school for girls, and Somes School for Boys. Town meetings are held every other year to elect officers. About 2 miles north of Aurora is the site of the Jesuit Mission to the Cayuga Indians in 1656. Aurora was settled in 1789, principally by emigrants from Connecticut. Pop., 1905, 623; 1910, 693.

**AURO'RA** (Lat. *Aurora*). The Roman goddess of the dawn, or "morning redness," counterpart of the Greek Eos. According to Hesiod, she was the daughter of Hyperion and Thia, sister of Helios and Selene, and wife of the Titan Astræus. Zephyrus, Boreas, Notus, Hesperus, and the other stars were her children. She rises in the east from Oceanus, or, in another story, from the couch of Tithonus, and her rays are the first indication of the coming of Helios (the sun). In legend Aurora appears chiefly as the abductor of beautiful youths, Tithonus, Orion, and Cephalus, the hunter. By Tithonus she became the mother of Memnon, and by Cephalus of Phaëton. In the earlier poets Aurora is never more than the early morning, and Euripides first identified her with Ἡμέρα, *Hēmera* ('the day'). In art she appears as present at the death and burial of Memnon, as carrying away her favorites, and as a goddess of light, either as a winged maiden, or as rising from the sea in a chariot with winged horses, preceding Helios.

**AURORA,** also called "The Triumph of Apollo," a renowned ceiling painting by Guido Reni in the Casino Rospigliosi at Rome. Aurora precedes the chariot of the sun god, scattering flowers in his path. The fresco is notable for its coloring and is the greatest work of the painter. For illustration, see RENI, GUIDO.

**AURORA BO'REA'LIS** (Lat. northern dawn or light). A luminous phenomenon seen during the night time in the heavens, most frequently in Europe, to the north of the observer's zenith, but sometimes covering the whole sky. By connecting together the statistics from all possible observers, Fritz was able to show that there is in the Northern Hemisphere a belt of greatest frequency. The centre of this belt passes through the southern part of Hudson's

Bay, a little south of Cape Farewell and Iceland, through North Cape, Norway, over the mouth of the Lena River, over Point Barrow, Alaska, thence to the centre of Hudson's Bay. Observers who are north of this belt see the aurora more frequently to the south than to the north, and also see it less and less frequently the farther north they go; observers who are south of the belt see the aurora to the north of them, but see it less frequently as they are nearer to the equator. A similar rule obtains in the southern hemisphere. There can be no doubt that the aurora is the result of a discharge of electricity through the atmosphere. It has been supposed that since a very thin atmosphere, such as that remaining in a glass jar or receiver of an air pump, converts the short bright electric spark into a lengthened delicate discharge, analogous to the aurora, the existence of the aurora itself necessarily implies a very thin atmosphere, and that therefore its light must emanate from a region 50 or 100 miles above the earth's surface. In order to explain the aurora, Arrhenius has recently advanced a theory based upon the discharge by the sun of electronegative ions. Such ions, caught in the earth's magnetic field, would be carried toward the magnetic poles and nearer to the earth's surface. On arriving at the lower layers of the atmosphere, they would part with their energy, giving rise to a discharge in appearance like that of a vacuum tube. As regards the height of the aurora above the earth's surface, several methods have been devised for calculating it; but it appears certain that the definite features that we see in the aurora light are perspective phenomena, and that the calculation of their height cannot be safely made by the method of simultaneous observations at two stations and measured altitudes and azimuth. In fact, the argument for the existence of the auroral light quite close to the earth's surface is too strong to be ignored. The character of this light is partially determined by means of the spectroscope, which establishes the fact that it comes from luminous particles of vapors or gases. The most prominent line of its spectrum is a yellow line, nearly identical with the yellow line known as the air line of the atmosphere. The special lines of the auroral spectrum apparently belong to the nitrogen.

The auroræ present a variety of interesting optical phenomena that may generally be analyzed into component parts; viz., long, slender beams of light, usually yellow, but sometimes green, purple, violet, or rose. These beams are, by observation, ascertained to be approximately parallel to the free magnetic needle; by their association together they appear to form cylindrical bars, waved surfaces, rich drapery, and small clouds of light. Inasmuch as the slender beams are parallel to each other, it can easily happen that an observer may be so located as to see some of them end on; these will be scarcely visible. Other beams near by will appear greatly foreshortened and pointing directly to the vacant centre. Those at a distance will appear less foreshortened, but also pointing toward the centre. There is thus formed a so-called corona, or circlet, or rays surrounding the central region. Observation has shown that its position corresponds very closely to that point in the sky toward which the free magnetic needle would point. It is therefore common to say that auroral beams are parallel to the magnetic needle; and this fact suffices to assure us that the aurora is composed of luminous magnetic matter acted upon by the so-called earth's magnetism, but, more properly, by the magnetic field surrounding the earth, just as is the compass needle.

**Bibliography.** The literature relative to the aurora borealis is very extensive and widely diffused. Excellent general summaries of our knowledge are: Fritz, *Das Polarlicht* (Leipzig, 1881); Angot, "Aurora Borealis," *International Scientific Series*, vol. 81 (London, 1896); Lemstrom, *L'aurore boréale* (Paris, 1886). The largest collections of observations arranged in the order of date will be found in the works of: Lovering, *On the Periodicity of the Aurora Borealis* (Boston, 1873); Fritz, *Verzeichniss von Beobachtungen des Polarlichtes* (Vienna, 1873); Rubenson, *Catalogue des aurores boréales observées en Suède* (Stockholm, 1879–82). The reports of the various international expeditions for the observation of meteorology and magnetism in the polar regions during 1881–83 fill about 30 volumes, of which one-fourth treat of the aurora. Information concerning the aurora is also contained in the reports of the polar expeditions of Nansen, Duc d'Abruzzi, Scott, and Drygalski. The pioneer work in this line was that done by the French *Expédition du Nord* (1838–42), whose volumes on auroras were prepared by Bravais and Martius. The question of the altitude of the aurora has been reviewed by C. Abbe in an article under that title published in *Terrestrial Magnetism* (Baltimore, 1900).

**AURORA LEIGH**, lē. A novel in blank verse, by Elizabeth Barrett Browning, which tells of the childhood of a young girl; the death of her Italian mother; her return to her father's English home; her gradually passing despair in her new surroundings; her love for her cousin, Romney Leigh; her melancholy disillusions, and her final marriage with him. Written during Mrs. Browning's early married life in Florence, it was published in 1856. She subsequently wrote of this poem that it was "the most mature of my works—the one in which my highest convictions of work and art have entered."

**AURUNCI.** See AUSONES.

**AURUNGZEBE**, ą'rŭng-zēb', or **AURANGZIB** (Hind. ornament of the throne). The last great Emperor of the Mogul dynasty in India. He was born in November, 1618, and died March 3, 1707. He was the third son of Shah Jahan, and in religion he was a bigoted Sunni, one of his additional titles being Mohi-eddin, 'reviver of religion.' He was set by his father over the Mogul Deccan, while his elder brothers, Dara and Shuja, resided respectively at Agra, with the court, and in Bengal. The youngest brother of Aurungzebe, named Murad, was Viceroy of Gujarat. In 1657 Shah Jahan fell seriously ill, and a contest for the throne was immediately begun by his sons. Aurungzebe, by a mixture of duplicity and fanaticism, outwitted his brothers, the two elder of whom he murdered, and made his father a prisoner in his own palace of Agra, and kept him so until the death of the latter, possibly by foul play, in 1665. The usurper assumed the title of Alamgir, or 'conqueror of the world.' The reign of Aurungzebe, which began in 1658, was troubled, almost as soon as it had begun, by the opposition of a Mahratta chieftain, a

daring freebooter from the mountains of Konkan, named Sivaji. Treachery was employed against this wily foe in vain, for he remained independent until his death, in 1680. A religious war against the Rajah of Udaipur, which dragged on for several years, resulted unsuccessfully for Aurungzebe, who was forced to abandon his military operations in Rajputana in 1682 on account of an abortive rebellion of his son Akbar. Between 1682 and 1689, however, Aurungzebe conquered the sultans of Bijapur and Golkonda and thereby brought the Moguls into touch with the English at Madras. The closing years of Aurungzebe's long reign were full of sorrow, and it is noteworthy that he alone, of all the Mogul emperors, forbade the composition of any history of his reign. Despite the external pomp and ceremony the Mogul Empire was tottering to its fall. The treachery of Aurungzebe alienated Mohammedan Shiites from him, while his religious bigotry won for him the undying hatred of the Hindus, whose faith he had insulted and had endeavored to exterminate. Consult Stanley Lane-Poole, *Aurungzib* (London, 1893); *Ruká at-i-Alamgri, or Letters of Aurungzebe*, translated from original Persian into English by Jamshid H. Billimoria (London, 1908); T. N. Sarkan, *Anecdotes of Aurangzib* and Historical Essays (London, 1912); id., *History of Aurangzib* (London, 1913).

**AUSABLE** (ą-sā'b'l) **CHASM.** A narrow gorge, 2 miles long, worn by the Ausable River, in the State of New York, in the hard quartz sandstone of the Potsdam formation, popular for its scenic attractions. The rocks of the neighborhood are traversed by numerous faults or lines of displacement, along which lines the hard rocks have been to some extent crushed and broken. The river has taken advantage of these lines of weakness and has worn its zigzag course to a depth, in places, of 175 feet along the almost vertical fault planes, thus affording an excellent example of the relation between faults and lines of drainage.

**AUS'CULTA'TION** (Lat. *auscultare*, to listen). A mode of exploration—by listening—of the condition of the heart, the lungs, the pleura, the œsophagus, certain arteries and veins, the abdominal organs, the gastro-intestinal tract, and the gravid uterus. Diseases, especially those of the heart and lungs, may be detected by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (immediate auscultation) or by the aid of a simple sound-conveying instrument, the stethoscope (q.v.) (mediate auscultation). The normal sounds produced by respiration and the beating of the heart are readily distinguished by the trained ear from the several abnormal sounds indicating disease. Auscultation is one of the most important means of diagnosis. Hippocrates observed the friction sound in dry pleurisy as well as succussion in pyopneumothorax. Auenbrugger of Vienna, in 1761, introduced percussion, and Piorry of France invented the plexímeter. Both probably appreciated some of the facts of auscultation. But Laënnec, in 1816, was the first to demonstrate the great value of auscultation and to introduce it into general use. Raynaud, in 1829, and Collin, in 1831, added respectively to our knowledge of pleuritic friction and pericardial friction. (See PERCUSSION.) According to the views, however, then generally held by physicians, the sounds produced by auscultation and percussion were capable of directly revealing the nature of diseases. In 1839 Skoda, in his *Abhandlung über Auskultation und Perkussion*, demonstrated that those sounds were only manifestations of peculiar physical states in the body. Being directly produced by certain diseases, those states, and not the sounds caused by them, must be considered as the true symptoms from which the character of diseases can be inferred. Consult Cabot, *Physical Diagnosis* (New York, 1912), and Le Fevre, *Physical Diagnosis* (New York, 1905).

**AUSGLEICH** (ous'glīk) **OF 1867, THE.** The written agreement which created the dual monarchy of Austria-Hungary out of the Empire of Austria and the Kingdom of Hungary. This agreement, or treaty between two equal states provides for a unique form of government. Each state retains its own Parliament, courts, administration, and constitution; but for both of them there is provided but one flag, ruler, and, in certain specified cases, one common policy. A common administration is provided for finance, foreign affairs, and war. Furthermore, for the purpose of guiding and controlling the common government in these three particulars and for providing joint legislation, two legislative bodies are elected—one Austrian, one Hungarian—termed "Delegations." These bodies have equal power; they meet alternately in Vienna and Budapest, and before them for approval must be laid the proposals of the common ministries. The powers of these delegations are severely limited, and the Ausgleich itself, which provides for their existence, cannot be legally changed in any way except by international agreement between the two sovereign powers of Austria and Hungary.

**AUSONES,** ą'sō-nēz (*Αὔσονες*, Gk. form of the name *Aurunci*). A hardy mountain tribe of ancient Italy, south of Rome, probably of Oscan stock, which in historical times dwelt on the coast between the rivers Volturnus and Liris; the Romans called them Aurunci. From 340 to 295 B.C. they fought the Romans, but they were completely subdued and their territory was given to Cales and Suessa Aurunca. The name "Ausonia" was later given to all the lands of the non-Latin tribes of central Italy, and finally by the poets it was used as synonymous with Italy itself.

**AUSONIA.** See AUSONES.

**AUSO'NIUS, DECIMUS MAGNUS** (c.310–394 A.D.). The most conspicuous Roman poet of the fourth century A.D. He was born at Burdigala (Bordeaux) about 310. His father was a man of considerable importance, having been at one time honorary prefect of Illyricum, and he appears to have taken care that the young Ausonius should receive an excellent education. Many amiable female relatives fostered and probably flattered the talents of the boy. After finishing his curriculum at Tolosa (Toulouse), he returned to Burdigala, where, after practicing for a short time at the bar, he turned his attention to literature (c.334) and soon distinguished himself as a professor of oratory. Many years later he was appointed by Valentinian tutor to his son Gratian, afterward quæstor, and by Gratian, Prefect of Latium, and subsequently Consul of Gaul (379). On the death of Gratian (383), Ausonius retired from public life to his estate at Burdigala, where he occupied himself with literature and rural pursuits until the time

of his death. The question whether or not Ausonius was a Christian has occasioned much controversy. He probably conformed to Christianity, but with a sort of pagan indifference. His works include translations of Greek eclogues, a collection of 150 epigrams, epistles in verse and prose, 20 so-called idyls and other descriptive pieces, which were admired in their day, and of late have once more come to be read with appreciation for their love of nature. But though destitute of the highest poetic quality, Ausonius occasionally displays a certain neatness and grace of expression, which show that in a better era he might have proved a greater poet. Besides these, he also wrote a panegyric on the Emperor Gratian, full of bombastic adulation. His best-known poem, *Mosella*, on the river of that name, contains many charming bits of description and some strikingly modern touches. The best edition of the text of Ausonius is that by Peiper (Leipzig, 1886). The *Mosella* has been edited with translation and commentary by De la Ville de Mirmont (Paris, 1889). Consult: Dill, *Roman Society in the Last Century of the Western Empire*, especially bk. ii, chap. iii (London, 1899); Mackail, *Latin Literature* (New York, 1896); J. K. Wager, *Questiones Metericæ Imprimis ad Ausonium Pertinentes* (Leipzig, 1907); A. Delachaux, *La latinité d'Ausone: étude lexicographique et grammaticale* (Lausanne, 1909).

**AUSPICES.** See AUGURIES.

**AUSSEE,** ou-sā' (Ger. *aus*, from + *See*, lake). A market town of Styria, Austria, situated at the southwest end of the crownland, at an elevation of 2135 feet (Map: Austria, C 3). Its mountain air, pine woods, and salt baths have made it a popular bathing place and health resort. The chief products are wood carvings and rock salt. In the vicinity are situated the three mountain lakes of Alt-Aussee, Grundl-See, and Toplitz-See, famous for their beautiful scenery. Pop., 1900, 1566; 1910, 1600.

**AUSSIG,** ou'sĭk (from Bohem. *Oustí nad Labem*, river mouth over Elbe). A flourishing manufacturing town of the Austrian crownland of Bohemia, about 455 feet above sea level, situated on the left bank of the Elbe, at its junction with the Biela, about 69 miles northwest of Prague, and 9 miles from the Saxon frontier (Map: Austria, D 1). Its notable public buildings are the Stadthaus, and the town church, supposed to date from 826, containing a fine painting of the Madonna, by Carlo Dolce, presented by Israel Mengs, whose son, the famous artist, Raphael Mengs, was born in Aussig. The town's affairs are administered by a municipal council of 36 and an executive board of eight members. The leading industrial establishment is a chemical factory employing upward of 1500 workmen, the largest in Austria. There are also manufactures of glass, pottery, woolen and cotton goods, and a considerable trade in grain, fruit, wood, mineral water, and coal, especially the latter, which is loaded on river barges and shipped down the Elbe. The town is an important station on the direct railway line from Dresden to Prague and one of the stations of the Elbe Steamship Line. It has two harbors on the river. Pop., 1890 (largely German), 24,000; 1900, 37,300; 1910, 39,255. Aussig was destroyed in 1426 by the Hussites and was taken by the Swedes, under Baer, in 1639.

**AUS'TEN,** JANE (1775–1817). A novelist whose books, if not startling or imposing, are held by the best judges to stand, despite their limitations, with the best work in English fiction. She was born Dec. 16, 1775, at Steventon, Hampshire, where her father was rector. Her education was better than that of the average country-bred girl of her time, and to a familiarity with contemporary English literature she added a knowledge of French and Italian. The English squirearchy and the upper professional classes, especially in the country, provided her with material for a series of novels peopled by characters astonishing in their vitality, who dwell in the memory as securely as those of Scott or Thackeray. Her touch is unfailingly creative, and by virtue of her method and material she is the mother of the modern novel in much the same sense in which Scott is the parent of the modern romance. Scott's praise of her is not less discriminating than generous, when he writes: "That young lady had talent for describing the involvements, feelings, and characters of ordinary life, which is to me the most wonderful I ever met with. The big Bow-Wow Strain I can do myself, like any now going; but the exquisite touch, which renders ordinary commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me." In Miss Austen's portraiture there is a fine irony that gives her work a wonderful zest and tang. Her books, thanks to her style and to her art of observing, selecting, and combining, prove that from the daily round and common tasks of a quiet and uneventful life perennially delightful fiction can be made, which may bid fair to appeal as strongly to other times and peoples as to our own. Her first published novel, *Sense and Sensibility*, appeared in 1811, to be followed between that year and 1816 by *Pride and Prejudice*, *Mansfield Park*, and *Emma*. Miss Austen died July 24, 1817, and it was not until the year after her death that two of her books appeared in print. These were her last novel, *Persuasion*, and *Northanger Abbey*, which had been written in or before 1797. Neither her *Letters* (published 1884) nor the few literary fragments that complete her work are of any strong interest. For the latter, see *Lady Susan*, a story in epistolatory form, and *The Watsons*, conveniently accessible in the collected works of Jane Austen (Boston, 1898). The important books about her and her work are: J. E. Austen Leigh, authorized *Life* (London, 1870); S. F. Malden, *Life* (London, 1889); Goldwin Smith, *Jane Austen* (New York, 1890); W. H. Pollock, *Jane Austen: Her Contemporaries and Herself* (New York, 1899); Constance Hill, *Jane Austen: Her Home and her Friends* (New York, 1902); G. E. Mitton, *Jane Austen and her Times* (London, 1905); J. H. and E. C. Hubback, *Jane Austen's Sailor Brothers* (London, 1906); W. D. Howells, *Heroines of Fiction* (New York, 1902); Austen-Leigh, *Jane Austen: Her Life and Letters; A Family Record* (New York, 1913); Cornish, in *English Men of Letters Series* (London and New York, 1913).

**AUSTEN,** PETER TOWNSEND (1852–1907). An American chemist; born at Clifton, Staten Island, N. Y. He received his education at the School of Mines of Columbia University, studied chemistry in Germany, and took his doctor's degree at the University of Zürich, Switzerland. In 1876 he returned to the United States and was made instructor in chemistry at Dartmouth College. In 1877 he was appointed professor of

chemistry at Rutgers College and during the following 10 years was engaged in teaching in that college and in the New Jersey Scientific School, serving also as State chemist of New Jersey. In 1887 he resigned his chair, and during the next six years devoted his attention exclusively to industrial work. In 1893 he resumed his career as a teacher and was made professor of chemistry at the Brooklyn Polytechnic Institute, where he remained until 1898. In 1899 he became the president of the Austen Chemical Research Company. Dr. Austen published a large number of interesting papers in applied chemistry, patented several valuable manufacturing processes, and wrote: *Kurze Einleitung zu den Nitro-Verbindungen* (Leipzig, 1876), and a translation of Pinner's *Repetitorium der organischen Chemie*, under the title *An Introduction to the Study of Organic Chemistry* (New York, 1883).

**AUS'TER.** The Latin name of the dry south or southwest wind, the modern sirocco, called *νότος, notos*, by the Greeks. The name is connected with the root of *uro*, to burn.

**AUSTERLITZ,** ous'tĕr-lĕts ("the east town on the Littawa"; from Ger. *Ost*, East). A town in Moravia, about 12 miles east-southeast of the town of Brünn (Map: Austria, E 2). It stands on the Littawa and has a population (1900) of 3703. Austerlitz is celebrated as the place where Napoleon I defeated the combined forces of Austria and Russia, under the command of their emperors (Dec. 2, 1805). The capitulation of the Austrian General Mack at Ulm on Oct. 17, 1805, had been followed by the French occupation of Vienna on November 14; but though Napoleon held the capital of the enemy, his forces were inferior to the allied army of Austrians and Russians under Kutusoff and Prince Lichtenstein, which was assembled around Olmütz and threatened a junction with another army under the Austrian archdukes and a force from Prussia. Napoleon determined to strike at the Allies before the expected junction could be effected. He moved northward from Vienna and at Austerlitz came in touch with the Allies, who had advanced to meet him. The latter, numbering some 84,000 men opposed to the 70,000 French, attacked in five columns, aimed in oblique order against the French right, their intention being to concentrate on that wing, outflank the enemy, and cut off their communication with Vienna. Napoleon, seeing their purpose, conceived the bold design of permitting the enemy to gain a temporary success over his right wing, which would allow him in turn to concentrate his forces against their weakened centre, and, having broken that, to take them in the rear. The plan was admirably executed. At 8 o'clock on the morning of December 2 the left wing of the Allies, consisting of three Russian columns, advanced across a country of frozen marshes, assailed Davout, who held the fords of the Goldbach, forced the passage of that stream, and compelled the French to retreat for some distance; with the aid of reinforcements, however, Davout was able to hold his own, as indeed Napoleon had planned. Meanwhile heavy masses of French under Soult had been hurled against the centre of the Allies, comprising the fourth Russian column, under Kutusoff; and after a sanguinary conflict the latter was overwhelmed. Lannes, too, on the left of the French, succeeded in driving back the allied right under Bagration. The victorious French troops were then swung upon the rear of the left of the Allies, and of the unhappy three columns the third was entirely crushed, while the others were shattered into fragments. The battle became a rout, and as the remnants of the Allies fled across the river the French artillery broke the ice and thousands of fugitives were drowned. The Allies lost 35,000 men in killed, wounded, and prisoners, while the French loss was only 7800. As a result of the battle, Austria was forced to sign the Treaty of Pressburg on Dec. 26, 1805. In the military career of Napoleon no other event, probably, stands out so brilliantly as Austerlitz, because of his numerical inferiority, the audacity of his plan, the precision with which it was executed, and the completeness of the victory. The glory of Austerlitz—spoken of, sometimes, as the battle of the three emperors, from the presence of the Russian and Austrian emperors in the field—made even the disaster at Trafalgar seem of little consequence.

**AUSTERLITZ,** THE SUN OF. A term applied to anything which augurs good. It is an allusion to the sudden appearance of the sun which brightened the overcast dawn just before the battle of Austerlitz, and which Napoleon accepted as an auspicious omen for the French.

**AUS'TIN.** A city, and the county-seat of Mower Co., Minn., 100 miles south of St. Paul, on the Chicago, Milwaukee, and St. Paul, and the Chicago Great Western railroads, and on Red Cedar River (Map: Minnesota, E 7). It is the seat of the Southern Minnesota University, and has three parks. Among the prominent buildings are the Carnegie library, central high school, county courthouse, State armory, post office, and St. Augustine's Church (Roman Catholic) and Methodist Episcopal Church. The city is surrounded by fertile prairie land, the products of which are principally live stock, butter, corn, barley, flax, and grass seeds. It exports extensively and has meat-packing establishments, flouring mills, brick and tile works, foundry, railroad shops, cement works, creamery, machine and steel works, roller mills, broom and brush factories, etc. Settled in 1854, Austin was incorporated as a village in 1868 and in 1873 was chartered as a city. The government is administered under a charter of 1903, which provides for a mayor, biennially elected, and a city council. The city owns its water works and electric light plant. Pop., 1900, 5474; 1910, 6960; 1920, 10,118.

**AUSTIN.** The capital of Texas, and the county-seat of Travis County, about 145 miles west by north of Houston, on the north bank of the Colorado River, which, in its lower course, is navigable for steamboats, and on the Houston and Texas Central, the International and Great Northern, the Missouri, Kansas, and Texas, and the Austin and Northwestern railroads (Map: Texas, D 4). It is about 40 feet above the river in the lower portion and gradually rises to an elevation of 120 feet. It is well laid out with wide and shaded streets. Capitol Square (10 acres) contains the Capitol building, of red Texas granite, which cost $3,500,000, and, next to the National Capitol at Washington, is the largest State Capitol in the United States. Other prominent structures are the State land office, county courthouse, and the buildings of the University of Texas (coeducational), opened in 1883. There are also the Confederate Home; a State asylum for the insane; an institution for the blind; an institution for the deaf and

dumb; an institution for the deaf, dumb, and blind (colored); a school for defectives; St. Edward's College; Southwestern Presbyterian Theological Seminary; Tillotson Institute (colored); Samuel Huston College (colored); several seminaries and academics, monuments, hospitals, etc. Two fine bridges span the river, and in 1893 a great dam, one of the largest in the world, was built 2 miles above the city, to provide water and power. It was carried away by a flood in 1900 and rebuilt at a cost of $1,720,000. It forms a lake 26 miles long and develops 6000 horse power. (See DAMS AND RESERVOIRS.) The export trade in agricultural produce, live stock, cotton, grain, wool, and hides is very large; and an extensive wholesale trade in harness and leather goods, groceries, dry goods, drugs, etc., is carried on. The manufactures include cotton-seed oil, lime, planed lumber, mantels, chili powder, mattresses, trunks, brooms, farm machinery, bricks, wire fence, gasolene engines, building materials, carriages, cement blocks, cigars, soap, and candles. The commission form of government, providing for a mayor and four councilmen, was adopted in 1909. The water works and electric light plant are owned and operated by the city. Austin, originally called Waterloo, was first settled in 1838, and in the following year was named after Stephen F. Austin (q.v.); incorporated and made the capital of the Republic of Texas in 1839; and later became the permanent capital of the State. The first free school in Texas was established here in 1871. Pop., 1900, 22,258; 1910, 29,860; 1920, 34,876.

**AUSTIN,** ALFRED (1835–1913). An English poet, born May 30, 1835, at Headingley, near Leeds. He graduated at the University of London in 1853 and was called to the bar in 1857, but abandoned law for literature. He became editor of the *National Review* in 1883. He was made Poet Laureate of England in 1896. Among his many volumes of verse are *The Seasons; A Satire* (1861); *Savonarola*, a tragedy (1881); *English Lyrics* (1890); *The Conversion of Winckelmann and Other Poems* (1897); *Songs of England* (new ed., 1900), and *A Tale of True Love and Other Poems* (1902), dedicated to President Roosevelt. Austin attracted some notice in 1870 by an essay entitled *The Poetry of the Period*, in which he severely criticised Tennyson, Browning, and other Victorians. As a critic he was original and interesting, and although he had not the imagination of the poets whom he attacked, he wrote some graceful verse. He also published *The Garden that I Love* (1894; 2d series, 1907), and *In Veronica's Garden* (1895) —two pieces in prose interspersed with short poems; *Haunts of Ancient Peace* (1902; new ed., 1908); *A Lesson in Harmony* (1904); *The Door of Humility* (1906, 1907); *Sacred and Profane Love* (1908); *The Bridling of Pegasus*, which the author called "prose papers on poetry" (1910); *Love Poems* (1911). Consult his *Autobiography* (2 vols., 1911).

**AUSTIN,** JANE GOODWIN (1831–93). A novelist who dealt with Colonial New England. The more noteworthy of her romances are *Fairy Dreams* (1860); *Moonfolk* (1874); *Mrs. Beauchamp Brown*, her best-known book (1880); *A Nameless Nobleman* (1881); *The Desmond Hundred* (1882); *Nantucket Scraps* (1882); *Standish of Standish* (1889); *Betty Alden* (1891); *David Alden's Daughter and Other Stories* (1892).

**AUSTIN,** JOHN (1790–1859). The most distinguished of English writers on jurisprudence. He was born at Creeting Mill, in Suffolk, England, on March 3, 1790. At the age of 16 he entered the army and served as a subaltern in Sicily and elsewhere for five years. Resigning his commission, he returned to London and took up the study of law, and in 1818 was called to the bar. In 1820 he married Miss Sarah Taylor, of Norwich, a gifted woman, to whose devotion, courage, and steadiness of purpose he was indebted for the few but remarkable achievements of his life. In the same year he went to live in Westminster and was a welcome member of the circle to which belonged Jeremy Bentham and James and John Stuart Mill, and many others of the foremost minds and characters in England. But his great social and conversational gifts did not bring him success at the bar, a natural infirmity of will and deficiency of courage being aggravated by weakness of constitution and frequent attacks of fever and debility. Accordingly he retired from practice in 1825, and the following year, upon the establishment of the University of London, he received the appointment of professor of jurisprudence in that institution.

This was before the period of the scientific study of the law in England, and her lawyers had not yet become aware of the existence of the science of jurisprudence. Hence his unrivaled powers of analysis and classification received scant recognition and his work resulted in disappointment and apparent failure. To prepare himself for his task, he went to Bonn, then the principal seat of juristic learning in Europe, and spent the winter reading and studying under Niebuhr, Brandis, Schlegel, Arndt, Welcker, and Mackeldey. Returning in the spring of 1828, he began his lectures at University College. His earnestness and enthusiasm were not adequate to render his precise and accurate definitions and his profound and refined reasoning attractive to the professional students of law, and it soon became evident that there was no demand for the scientific teaching of jurisprudence. The number of his students dwindled to a mere handful. Unfortunately no provision was made for the chair of jurisprudence beyond class fees; and in the absence of students Austin, in 1832, was reluctantly compelled to resign his appointment. In the same year he published his *Province of Jurisprudence Determined*, a work at the time little appreciated by the general public, so that the slight success it met with did not encourage him to undertake other publications on the subject. In the estimation of competent judges, however, it placed its author in the highest rank among writers on jurisprudence. In 1833 he was appointed by Lord Brougham a member of the criminal-law commission. The post was not much to his taste, as he did not believe that the public received any advantage from such bodies, in the efficacy of which for constructive purposes he put no faith.

In 1836 he and his friend and pupil, Sir George Cornewall Lewis, were appointed commissioners to inquire into the laws and usages, the administration and state of government of the island of Malta, a congenial task which was performed with remarkable ability and thoroughness. But again his health broke down, and in 1838 he returned to England, only to be ordered abroad by his physicians. The next 10 years were spent on the Continent, but the Revolution of 1848 drove him back to England. He then

settled at Weybridge, in Surrey, where he lived until his death in December, 1859. His lectures on the principles of jurisprudence had remained in manuscript and were left by him in a fragmentary and imperfect state. It is due to the intelligence and zeal of his widow that they were subsequently collected and arranged for publication and in 1863 given to the world under the title *Lectures on Jurisprudence, Being the Sequel to "The Province of Jurisprudence Determined,"* of which latter she had published a second edition in 1861. On this work his fame now rests.

Austin's great merit consists in the remarkable clearness and penetration of his analysis of legal conceptions. He was the first English writer to attach precise and intelligible meaning to legal terms, as well as the first systematic writer on law in the English language. With an adequate knowledge of the principles and methods of Roman and English law, he combined an extraordinary talent for classification and definition. Fragmentary and incomplete as it was, his work revolutionized the science of jurisprudence and became the text-book of the school of analytical jurists that has dominated the legal thought of the nineteenth century in England and America. His doctrines have had but little influence elsewhere, however, the continental jurists adhering with singular unanimity to the classification and conceptions of the Roman law. Indeed, even in the Anglo-Saxon world, a reaction has lately set in against the Austinian conceptions of law and politics, owing to the enlarged knowledge of human society and the historical spirit which have so profoundly modified the thought of our generation. Austin's limitation of the conception of positive law to the commands of a sovereign, and his restriction of sovereignty to an external political authority, have been especially subjected to criticism. They are, however, reasserted and strongly defended by his most distinguished disciple, Prof. Thomas E. Holland, in the latest edition (1900) of his *Elements of Jurisprudence*, and by W. Jethro Brown in *The Austinian Theory of Law* (Boston, 1910). For the opposite view Sir Henry S. Maine's works may be consulted, especially *Early Law and Custom* (London, 1883), and *Early History of Institutions* (London, 1875). The pathetic story of Austin's life is related by his widow in her introduction to the second edition of his *Province of Jurisprudence Determined* (London, 1861); and John Stuart Mill has included a sympathetic but just and discriminating criticism of the man and his work in his volume *Dissertations and Discussions* (4 vols., London, 1875). See JURISPRUDENCE; LAW; SOVEREIGNTY.

**AUSTIN,** JONATHAN LORING (1748–1826). A diplomatic agent of the United States in Europe during the Revolutionary War. He was born in Boston, graduated at Harvard in 1766, and engaged in trade at Portsmouth, N. H. In 1775 he entered the American army as a major, and for a time was one of General Sullivan's aids. He also served as secretary of the Massachusetts Board of War, and in October, 1777, was sent to Paris by Massachusetts to announce to Franklin and his associates the news of Burgoyne's surrender at Saratoga. Franklin soon afterward sent him on a singular secret mission to England, where he met many members of the Opposition and furnished them with much information concerning American affairs. The trip was full of incident, and, says one of Franklin's biographers (Morse), "brings to mind some of the Jacobite tales of Sir Walter Scott's novels." He carried dispatches to Congress from the United States Commissioners in Paris early in 1779, and in January, 1780, was dispatched to Europe to secure loans for Massachusetts in Spain and Holland, but failed in his mission and was captured and held for a short time by the British. Late in 1781 he returned and subsequently held various State offices of more or less importance.

**AUSTIN,** MARY HUNTER (1868—). An American author and playwright, born at Carlinville, Ill., and educated at Blackburn University. For 17 years she made a special study of Indian life in the Mojave Desert, and her publications set forth the intimate knowledge she thus acquired. She is the author of *The Land of Little Rain* (1903); *The Basket Woman* (1904); *Isidro* (1905); *The Flock* (1906); *Santa Lucia* (1908); *Lost Borders* (1909); *Christ in Italy* (1912); *The Lovely Lady* (1913). Her play, *The Arrowmaker*, dealing with Indian life, was produced at The New Theatre (New York) in 1911.

**AUSTIN,** OSCAR PHELPS. An American statistician, born in Newark, Ill., and educated in the public schools. The earlier years of his life were spent in journalism, and he served as reporter, editor, and Washington correspondent for metropolitan dailies. Subsequent to making a special study of statistics, he was appointed (1898) chief of the Bureau of Statistics of the Department of Commerce and Labor. This position involved the editing and compilation of most of the important statistical documents prepared by the bureau during a period of about 14 years. When the Bureau of Statistics was abolished, and merged in the Bureau of Foreign and Domestic Commerce in 1912, Mr. Austin became its assistant chief. In 1903–14 he was professor of commerce and statistics at George Washington University, and in 1914 became statistician of the foreign trade department, National City Bank, New York. He wrote on the commerce of nations, or of continents, comparisons of colonial systems, submarine telegraphs, canals, manufacturing systems, and national debts. Mr. Austin was statistical editor of the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

**AUSTIN,** SARAH TAYLOR (1793–1867). An English translator and author, the wife of John Austin. She was born at Norwich, a member of a family remarkable for the men and women it has produced distinguished by literary and scientific ability. She spent several years abroad, enjoying the friendship of many eminent persons in continental society. She translated, from the German: *Characteristics of Goethe*, by Falk, and others, with notes (1833); *The Story without an End*, by Carové (1834), and Ranke's *History of the Popes* (1840). Though Mrs. Austin did some original work, as *Germany from 1760 to 1814*, she is chiefly known as an excellent translator. Consult the London *Athenæum* for Aug. 17, 1867.

**AUSTIN,** STEPHEN FULLER (1793–1836). An American pioneer and politician, known as the founder of the State of Texas. He was born in Wythe Co., Va., the son of Moses Austin, who originally, from Connecticut, projected the Texan colony which was finally established in 1821 by his son, on the site of the present city of Austin. The latter, by his energy, ability, and hardihood, made the experiment a success; and other colonists settled in the vicinity, until the Americans became so numerous that they held a

convention in March, 1833, to form a separate State government. Without heeding the Spanish population they agreed upon a plan, and Austin took it to the City of Mexico to obtain its ratification; but a revolution there prevented a hearing, so he wrote advising the Texans to form the State government without waiting for the consent of the Mexican authorities. This cost him three months' imprisonment and a longer surveillance; but in 1835 he returned to Texas and took command of the small Revolutionary army. In November he went as commissioner to the United States and endeavored to obtain the recognition of Texas as an independent State. He returned in 1836 and was made a candidate for the presidency of the lately established Republic of Texas. Samuel Houston, who defeated him for this office, chose him his Secretary of State, but Austin died suddenly on Dec. 27 of the same year. Consult Yoakum, *History of Texas* (New York, 1856), and Wooten, *History of Texas* (2 vols., Dallas, 1899), which contains many hitherto unpublished documents concerning the Austins and their work.

**AUSTIN,** WILLIAM (1778–1841). An American lawyer and author, born in Massachusetts. In addition to *Letters from London* (1804), *An Essay on the Human Character of Jesus Christ* (1807), and several minor works, he published the legendary tale of "Peter Rugg, the Missing Man," in the *New England Galaxy* (1824–26). Consult *Literary Papers of William Austin*, with a biographical sketch (Boston, 1890).

**AUSTIN FRI'ARS.** A monastery in old London, on Broad Street, built by the Earl of Hereford and Essex in 1253–54 and holding the tombs of various historic characters. After the dissolution of the monasteries by Henry VIII in 1536–38, which included the confiscation of 173 Augustinian houses, Austin Friars became a Dutch church under a grant of Edward VI. The building suffered various alterations, the spire being razed and the nave walled up. The Dutch residents of the city still worship there. See AUGUSTINIANS.

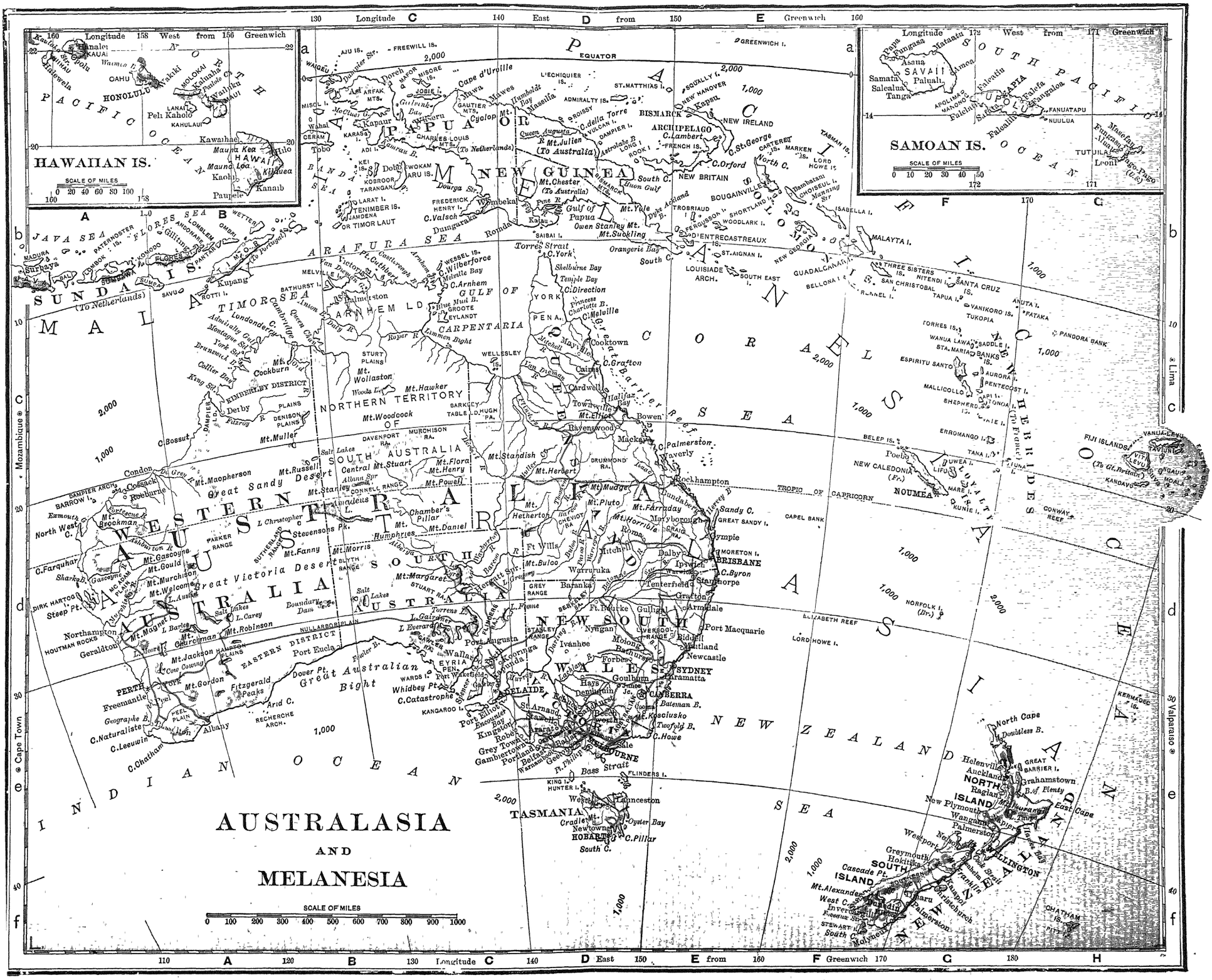
**AUSTRALASIA,** ąs'tral-ā'shȧ *or* -zhȧ (Neo-Lat. Southern Asia, from Lat. *australis*, southern + Asia). A geographical term of rather loose application, used by some British geographers to denote all the islands of the southern Pacific, including Australia, New Guinea, New Zealand, Melanesia, and Polynesia; while most writers in America and the European continent confine it to Australia, Tasmania, and New Zealand.

**AUSTRA'LIA** (Neo-Lat. Southland, from Lat. *australis*, southern). The island continent lying southeast of Asia and the East Indies. It is situated wholly within the Southern Hemisphere, between lat. 10° 50′ and 39° 10′ S., and between long. 112° 52′ and 153° 34′ E. Roughly its shape is that of a hexagon with two reëntrant sides. The greatest length is along the middle parallel, at about 25° S., and is nearly 2400 miles; while the greatest breadth, which is in the eastern part, in long. 143° E., is about 1900 miles. Its area is 2,946,700 square miles, slightly less than that of continental United States. In common with the two other southern continents, South America and Africa, Australia is compact in shape, its coast having few large indentations or projections. Only at three places are there sharply defined large peninsulas: (1) Arnhem Land and (2) York Peninsula, in the north, which inclose the largest indentation of the continent, the Gulf of Carpentaria; and, in the south, the smaller (3) Eyre and York peninsulas, inclosing Spencer Gulf, and the peninsula which, with the York Peninsula, incloses St. Vincent Gulf, on which Adelaide lies. The great inward bend on the south side of the continent, corresponding to the two reëntrant sides of the hexagon to which Australia was compared in shape, is known as the Great Australian Bight. Owing to its compact mass the centre of the continent is at least 550 miles from the nearest coast and the "coast-distant" region (i.e., at least 375 miles from the nearest coast) occupies a relatively larger area than does the analogous region in the larger continent of Europe (17 per cent as against 15½ per cent). As regards its world relationships Australia may be defined as the southern end of the Afro-Eurasian land mass, being connected with the Asiatic continent by means of the island bridges, as it were, of Indonesia and New Guinea. The fact that these islands rest upon a continental platform, together with the faunal and floristic evidence, points to the existence of a former land connection with Asia. To the north this transition is established by the shallow Arafura Sea, which connects Australia with New Guinea, while in the south Tasmania, inasmuch as it lies upon the same continental platform (Bass Strait, average depth, 200 feet), must be counted as belonging physically to Australia. While the continent thus faces land masses to the north, it looks out upon an immense waste of water to the west and south. To the east lies the Pacific, island-dotted, to be sure; but the aggregate land area of its islands is negligible. Thus, on three sides Australia stands aloof. Prior to the development of interoceanic communication such isolation meant stagnation.

**Topography and Hydrography.** Of all the continents Australia presents the least relief. Except for a narrow mountainous belt in the east, its surface consists mainly of an extensive tableland and a lowland. Nowhere does it attain high altitudes; 95 per cent of its surface lies below 1500 feet, and three-quarters lie between 600 and 1500 feet. Its mean elevation, 1150 feet, is less than that of any other continent save Europe (1000 feet). Its highest altitude is only 7350 feet, attained by Mount Kosciusko.

From east to west, Australia may be divided topographically into (1) the Eastern Mountains, (2) the Central Lowlands, and (3) the Great Plateau Region.

The Eastern Mountains accompany the whole east coast in a belt convex to the east from York Peninsula in the north almost to the mouth of the Murray in the south. This belt has an average width of 150 miles and is the only continuous mountain region in the continent. It consists of plateau-like masses on which are superimposed mountain ranges; these masses are separated from each other by deep gaps. The mountain belt slopes gradually down to the lowlands on the west, while it has an abrupt descent toward the sea. At the base of the seaward slope lies a narrow coastal plain which is divided into compartments by transverse spurs from the main axis of the mountains. Taken as a whole, the eastern mountain belt increases in altitude from north to south. It may be roughly divided into two sections: (1) the Queensland Highlands, and (2) the Southeast Highlands, the transverse Macpherson Range south of Brisbane being considered the line of


AUSTRALASIA
AND
MELANESIA
HAWAIIAN IS.
SAMOAN IS.
SCALE OF MILES
0 100 200 300 400 500 600 700 800 900 1000
INDIAN OCEAN
PACIFIC OCEAN
AUSTRALIA
NEW GUINEA
NEW ZEALAND
TASMANIA
SUNDA IS.
SOLOMON IS.
NEW HEBRIDES
FIJI ISLANDS
NOUMEA
PERTH
ADELAIDE
MELBOURNE
SYDNEY
CANBERRA
BRISBANE
HOBART
WELLINGTON
AUCKLAND
CHRISTCHURCH
HONOLULU
Longitude
Greenwich
Equator
Tropic of Capricorn

division. In the north, in the York Peninsula, the Queensland Highlands are represented only by low granitic ridges. To the south the highlands expand to a width of 300 miles; they do not constitute a compact mountain region but consist of numerous ramifying ridges which culminate in the Bellenden Ker Mountains (5440 feet). For some 1200 miles the Queensland Highlands are flanked by the Great Barrier Reef, the coral-overgrown outer margin of the continental platform. Within this wall, which lies some 30 to 75 miles from the coast, is an inland sea averaging some 20 fathoms deep. The Southeast Highlands consist mainly, from north to south, of the mountain masses of the New England Range, the Blue Mountains, the Australian Alps, and, bending around to an east-west trend, the Victorian Highlands. The New England Range is for the greater part over 3000 feet in height; it culminates in Ben Lomond, 5000 feet. To the south it is separated by various gaps, mainly the depression of the Hunter River valley, from the Blue Mountains. The steep cliff wall with which the Blue Mountains break off to the east long presented an insurmountable barrier to the western march of settlement. The Goulburn Gap, which contains Lake George, the largest lake of New South Wales, separates the Blue Mountains from the Australian Alps to the south. This massif is the highest mountain mass in Australia; it culminates in Mount Kosciusko, 7350 feet. Its name is hardly appropriate, as its forms are rather those of rounded domes than of Alpine crags. However, the higher altitude, with its greater precipitation, makes for considerable snowfall, snow sometimes remaining almost all the year on the sheltered slopes. The moraines and smaller lakes and tarns due to former glaciation also give a touch of Alpine character. To the east the Victoria Highlands abut immediately on the Kosciusko massif; here they attain hardly inferior altitudes (Mount Hotham, 6100 feet; Mount Feathertop, so-called from its snow cap, 6300 feet; Mount Bogong, 6500 feet). To the west the Victoria Highlands gradually decrease in height, where they bear the name of the Grampians (3500 feet) until they strike the coast at Mount Gambier in 38° S. lat. and 141° E. long.

The second topographical division of Australia, the Central Lowlands, lies between the Eastern Mountains on the east and the Great Plateau Region on the west and extends across the continent from the Gulf of Carpentaria to the south coast. It may further be subdivided into (1) the Darling-Murray basin, (2) the region with interior drainage, and (3) the lowland surrounding the Gulf of Carpentaria. The first is separated from the second by a divide which runs southwesterly from the Eastern Mountains in 25° S. lat., to the coast at Adelaide. Different parts of this range are known as the Grey Range, the Stanley Range, and the Adelaide Range. The common boundary between the second and third divisions is the east-west divide separating the interior drainage from the drainage of the Gulf of Carpentaria.

The Murray-Darling basin, which occupies about one-seventh of the whole continent, contains the only large river system of Australia. Its longest member, the Darling, with its source streams, the Condamine and Barwan, rises on the inner slopes of the Eastern Mountains in the latitude of Brisbane and flows southwest into the Murray, which, together with its tributaries, the Lachlan and Murrumbidgee, heads in the Eastern Mountains south of the latitude of Sydney, and flows west and then south until it empties into the Indian Ocean. This drainage basin, as large as that of the Danube, does not attain an importance commensurate with its size. Although its source streams are well fed, the limestone region through which the rivers flow in the lowland, and the progressive decrease of rainfall and increase of evaporation to the west rob the streams of the greater part of their supply. Only 25 per cent of the precipitation of the Murray drainage basin and 1½ per cent of that of the Darling basin ultimately reach the sea.

The region with interior drainage is characterized by the lack of outlet of its rivers. This is due to the extreme aridity of the region. Its drainage channels, whose condition is generally that of dry river beds, have their origin in the Great Plateau Region, in the divide to the Gulf of Carpentaria and in the Eastern Mountains, whence they flow convergingly southeast, south, and southwest as the Finke River, the Georgina River, and Cooper Creek, respectively, and empty (when they carry water) into Lake Eyre. Lake Eyre is the largest lake of the continent; having no outlet, it is saline. It lies 35 feet below sea level. To the south it is continued by the depression containing Lake Torrens—likewise without outlet—and Spencer Gulf; this depression is probably a rift valley, or structural trough. It is bounded on the east by the north-south trending Flinders Range. Additional lakes without outlet are Lake Gairdner, west of Lake Torrens; Lake Blanche, north of the Flinders Range; and Lake Frome, on the eastern flank of its northern end.

The lowlands surrounding the Gulf of Carpentaria are tropical in character. They consist mainly of the drainage basin of the Leichhardt, Flinders, Gilbert, and Mitchell rivers.

The third topographical division of Australia, the Great Plateau Region, occupies the remainder—about 54 per cent—of the continent. Its average elevation is about 1000 feet. Along its western edge, near the coast, it contains a belt of higher land, while its eastern border, adjoining the Central Lowlands, is flanked by east-west trending ranges of considerable height. Mainly on the score of climatic differentiation the Great Plateau Region may be subdivided into three parts: (1) the tropical region of the north coast, (2) the temperate region of the southwest tip of the continent, and (3) the desert region of the interior. The tropical region includes the Kimberley district, a region of greater elevation culminating in the King Leopold Range and drained by the Fitzroy and Ord rivers, and Arnhem Land, also higher than the plateau surface, drained by the Daly and Roper rivers. The temperate region rises gradually from the interior to the west coast, where it breaks off to the sea in the escarpment of the Darling Range. It is characterized by an annual rainfall of over 10 or 15 inches. The interior desert region is the culminating expression of the aridity of the continent. For the greater part it has the appearance of a limitless, slightly undulating surface, broken here and there by low, bare ridges. The surface is strewn with rock fragments; the characteristic vegetation is spinifex grass. Toward the west coast the land rises; this section is drained to the sea by the Murchison, Gascoyne, Ashburton, and Fortescue rivers. On the

eastern border of the plateau region are the east-and-west trending ranges mentioned above, among which the system of ranges known as the Macdonnell Range (summit, 4800 feet) and the Musgrave Range (summit, 5200 feet) are the most important. To the south the plateau region with its desertic conditions breaks off abruptly at the sea, making the coast of the Great Australian Bight inaccessible and inhospitable.

**Climate and Rainfall.** Australia lies within the region of the southeast trades and the high (atmospheric) belt. It is thereby predisposed to a warm, dry climate; this tendency is emphasized by its compact mass, which does not allow oceanic influences to penetrate far into the interior. Its extent through 30° of latitude (10°–40° S.) naturally makes for a great variety of climate; broadly speaking, the continent belongs to three zones as defined by the July (southern winter) and the annual isotherm of 68° F.: (1) the tropical zone, which includes York Peninsula, Arnhem Land, and the Kimberley district; (2) the semi-tropical zone, which includes the middle zone of the continent up to a line excluding the southwestern tip, the southern part of South Australia and New South Wales and all of Victoria, and (3) the warm temperate zone which includes the last-named regions.

In a region so extensive very great varieties of climate are naturally to be expected, but it may be stated as a general law that the climate of Australia is milder than that of corresponding latitudes in the Northern Hemisphere. During July, which is the coldest month in southern latitudes, one-half of Australia has a mean temperature ranging from 40° to 64° F., and the other half from 64° to 80°. During December the temperature ranges from 50° to above 95°, half of Australia having a mean temperature of 83°. The region possessing a mean summer temperature in excess of 95° F. is the interior of the Northern Territory of South Australia, north of the 20th south parallel; and the whole of the country, excepting the seaboard, lying between the east meridians of 120° and 140° and north of the 25th south parallel, has a mean temperature in excess of 90° F. On the other hand, the Pacific slopes of New South Wales are remarkable for the salubrity. The climate of the great plains of Queensland, New South Wales, and northern Victoria, in spite of the heat of part of the summer, is eminently healthy. In Victoria the heat is generally less intense in summer and the cold greater in winter than in New South Wales. Melbourne, in lat. 37° 50′ S., has a mean temperature of 57.3°, and therefore corresponds to Bathurst in New South Wales, Washington in the United States, and Madrid, Lisbon, and Messina, in Spain, Portugal, and Sicily respectively; but with this difference—the variation between summer and winter temperatures is less at Melbourne than at any of the cities just cited. It is a rare thing for Melbourne summer heat to exceed 85° or the winter temperature in the daytime to fall below 40°. The mean temperature of Brisbane, during the first, second, and last months of the year is about 76°, while during the sixth, seventh, and eighth it averages about 60°. However, the winter in Rockhampton, farther north, averages 65° with a summer heat almost to 85°, while at Townsville and Normanton, still farther north, the average temperature is increasingly higher. In this respect the southern portions greatly resemble the coast of Italy, the coldest months being June, July, and August, during which the temperature is very agreeable, ranging between 52° to 54° F.; but the climate of the Northern Territory is exceedingly hot, except on the elevated tablelands. In the southern and early settled parts of Western Australia the mean temperature is about 64°, with a maximum of 106°, and a minimum of 39°. But although for three months of the year the heat is very great in the daytime, the nights and mornings are almost always cool.

The rainfall of Australia varies as greatly as its climate. In New South Wales, the parent state, it ranges from an annual average of 64 inches at Port Macquarie, on the north coast, and Kiandra, in the Monaro district, to 9 inches at Milparinka, in the trans-Darling country. The coastal districts average about 42 inches per annum; on the tableland the mean rainfall is 32 inches, but in the western interior it is as low as 20 inches, while at the ten stations in the far west the average was only 14 inches. The average rainfall of Sydney during 42 years was 50 inches, while during 1901 a fall of 40 inches was recorded. During the year 1900 the rainfall at Melbourne amounted to 28.09 inches, the second highest total during the preceding decade, while for a long series of years it averaged 25.58 inches, with an average of 131 days during the year on which rain fell. At Echuca, during 1900, the number of inches of rain recorded was 15.8, while at Portland it was 32.82, and at Wilson's Promontory, 42.8. The average rainfall of Queensland is high, on account of its situation within and near the Tropic of Capricorn. Along the northern coast it ranges from 60 to 70 inches per annum. At Brisbane 50.01 inches is the average of 35 years, and even on the plains of the interior from 20 to 30 inches fall every year. During 1900, 34.41 inches of rain fell in Brisbane —the number of wet days being 110. On the whole, the weather of South Australia is remarkably dry. At Adelaide there are, on an average, 120 rainy days per annum; during 60 years the mean rainfall was 20.88 inches per annum, while farther north the quantity recorded was considerably less. The country is, however, naturally healthful, and in evidence of this it may be mentioned that no great epidemic has ever visited this state. Notwithstanding the great heat experienced by Europeans in the Northern Territory, it is a fact worthy of notice, also, that the malarial fevers which are so troublesome to the pioneers throughout almost the whole of the northern parts of Australia, partially, and in some cases wholly, disappear after the land has been settled and consolidated by stock. The rainfall in the extreme north, especially in January and February, is exceedingly heavy. The average annual rainfall in the coast districts is about 63 inches. Western Australia has practically only two seasons, the winter, or wet season, which begins in April and ends in October, and the summer, or dry season, which comprises the remaining six months of the year. During the wet season frequent and heavy rains fall, and thunderstorms with sharp showers occur in the summer. The extremes of drought and flood experienced in the other states are almost unknown in Western Australia, but during the summer months the northwest coast is sometimes visited by hurricanes of great violence. At Perth, in 1900, the rainfall was 36.61 inches, and rain fell on 124 days. Observations extending over a

period of 22 years show an average rainfall at Perth of 33 inches. In the northern parts of Western Australia the heat is excessive, though the dryness of the atmosphere makes it preferable to most tropical climates.

**Geology.** The Eastern Mountains are composed mainly of Silurian beds, with, however, large areas of Carboniferous formation, while in the neighborhood of Sydney, New South Wales, and Ipswich, Queensland, are large areas of what are probably Jurassic beds. Throughout the range intrusions of granite are abundant. The Darling Range, on the west coast, is composed of more recent beds, probably Jurassic. East of this range, stretching far into the interior, the country is overlaid irregularly with granite, and the same rock appears in many, if not most, of the mountain ranges of the interior, breaking through the Tertiary and Cretaceous beds which floor the plains and plateaus of this region. The distribution of these last two formations in the interior may be broadly characterized by the statement that the interior portions of Queensland and New South Wales are underlain mainly by Cretaceous beds, while the interior of Western and South Australia is mainly covered with Tertiary formations. There are, however, considerable tracts in the interior which are covered by older rocks. Thus, in the southern part, north of Spencer Gulf and the Gulf of St. Vincent, is a large area of Paleozoic beds extending inland as far as Lake Eyre, while from the head of the Gulf of Carpentaria an area of the same age extends southward. Tasmania is composed mainly of Silurian strata; Carboniferous and Jurassic beds and older crystalline rocks appear, however, both in the interior and on the east coast. Gold-bearing rocks and other valuable mineral deposits are widely disseminated throughout Australia.

There are no active volcanoes on the continent, but there are several areas of extinct volcanoes. They are very numerous in the State of Victoria in the southeast, where they have had much to do with shaping the present conformation of the land. There are but few in New South Wales, although outflows of basalt through low vents were numerous and extensive in that colony during Tertiary times. In Queensland the volcanic area is extensive, especially in the interior. In South Australia is the well-known volcanic group which has Mount Gambier for its central figure.

**Flora.** A brief description of the vegetational provinces of Australia may be helpful as an introduction to the discussion of its flora. We may distinguish between seven provinces. 1. The tropical forest occupies the whole northern and east coast from Arnhem Land nearly to the latitude of Brisbane. It is a fairly open, deciduous forest of the drier monsoon type. The equatorial type of forest is found only in tracts with sufficient ground water. Mangroves fringe the coast here and there. 2. The wet summer evergreen forest occupies the seaward slopes of that section of the eastern mountain belt designated the Southeast Highlands. (See *Topography; Drainage.*) It belongs to the luxuriant moist type of warm temperate countries, with tall eucalyptus as the dominant feature. 3. The dry summer evergreen forest covers the Victorian Highlands, the southern end of the Flinders Range on the east shore of St. Vincent Gulf and the southwestern tip of the continent. It belongs to the Mediterranean type of evergreen vegetation. 4. Practically the whole Darling-Murray basin between the Eastern Mountains and the Flinders Range, except adjacent to the lower course of the Murray, is steppe. The *hinterland* of the western part of the Great Australian Bight belongs to this formation. 5. Savanna occupies a belt roughly 300–400 miles wide across the whole northern part of Australia from the Kimberley district east to the southern part of the Queensland Highlands. As far as Arnhem Land it reaches the coast; from here eastward it lies on the inner side of the tropical coastal forest. 6. That part of the Great Plateau Region which is not occupied by the vegetations already described or by desert is the home of the scrub. This most typical of Australian plant formations consists of a dense mass of low trees and shrubs which, in its impenetrability, has been one of the greatest obstacles in the exploration of the interior. 7. Finally, the desert occupies most of the plateau between 120° and 133° E., included between the savanna on the north and the scrub on the south, and detached areas occur northeast of Macdonnell Range and north of Lake Eyre.

The flora as a whole is very distinctive, and, moreover, is of two very marked and characteristic types. That of the moist east and north coasts is tropical in its luxuriance, and that of the interior, and the south and west coasts, is characteristic of the desert. Upwards of 12,000 species of plants are found, of which number not less than 7000 are peculiar to the continent. The leaves of many of the plants are of tough, fibre-like consistency, and some of them are needle-shaped; thus rapid evaporation is prevented, for they do not expose as much surface to the heat rays as do the broad-leaved plants. The foliage is somewhat monotonous after the manner of regions where specific types prevail. Australia possesses a great extent of territory in which the soil would produce a rich vegetation if only the proper watering could be accomplished.

Eastern and northern Queensland, with its moist tropical climate, produces a dense plant growth of Indo-Malayan character, such as tree ferns, bamboos, palms, and canes, with numerous parasitic plants and orchids. The palm and the pandanus (of the screw-pine family), with their aërial roots and palmy branches, are distinctive forms of this section. The bottle tree also, with its curious shape, deserves mention. The grass tree is also found in the eastern Australian region. In Victoria the vegetation is almost tropical in its richness in the mountain regions, but on the plains is somewhat sparse, the trees growing in park-like clumps. Here the eucalyptus reaches its greatest height (exceeding 400 feet), tree ferns present their wonderful growth, and numerous small ferns aid in giving a peculiar aspect to the vegetation. Fan palms and acacias flourish. Grass and salt bushes are distinctive types of lowland flora. In the great central region known as South Australia and the Northern Territory there is a sparse vegetation, the scrub or mallè being general, together with sedges, grasses, etc., as well as the grass tree, thorny plants, and a stunted growth of eucalyptus. Thickets of the paper-bark tree also occur. This growth (known as the "bush") is impenetrable by man in some regions. On the coast are found mangroves.

In July (midwinter) the following vegetation conditions prevail: in northern Australia, along the borders of the Gulf of Carpentaria, the

vegetation is tropical in character with no cessation of the growing period. To the south of this, all along the northern part of the continent, is a less rich tropical vegetation with a cessation during the dry season. In the southern part of the east coast and the eastern and western parts of the south coast are evergreen trees and a bushy growth, with a short period during which vegetation is at a standstill. In the remainder of the continent are grass lands, bushy steppes, and desert areas in which the vegetation rests at this time of year (the winter time of the Southern Hemisphere). In January (midsummer) on the north coast the narrow strip of rich tropical vegetation suffers no interruption in growth, and in the belt of less rich tropical vegetation to the south of it vegetation is in its full development during the rainy season. The vegetation in the southeastern and southwestern parts is much restricted by the summer drought. In the interior the steppes have their summer verdure in regions where there is sufficient rain, but in the southwest the principal season of growth is from September to October, during the southern spring.

**Fauna.** The animal life is more peculiarly isolated than is that of any other great region of the globe. This is due to the fact that the destruction of the connection of Australia with Asia, although belonging to a relatively recent geological period (late Cretaceous or early Tertiary) happened at a relatively remote time in the biological time scale, before the larger orders had reached an advanced stage of development or had been able to reach Australia.

Of the non-aquatic mammalia only two of the orders found on the other continents are represented, the bats and the rodents. The others have their places taken by the two orders peculiar to Australia, the marsupials or pouch mammals, and the Monotremata or egg-laying mammals. There are six families of marsupials which include about 30 species. They differ greatly in form, in appearance, and in habits, resembling wolves, marmots, weasels, squirrels, flying squirrels, and jerboas, and feeding on flesh, insects, roots, fruits, honey, leaves, and grass. The flesh eaters are the native cats, rats, and mice, which are common to the continent, and the larger species, the so-called tiger of Tasmania. The insect eaters are the bandicoots or bandicoot rats. The root eaters are the wombats, all large burrowing animals. The fruit eaters are the native bear, a sloth-like creature, three varieties of opossums, the flying opossums, and the flying squirrels. The grass eaters are the kangaroos, of which there are numerous genera; the large kangaroos, the small kangaroos, the rock wallabies, and the hare kangaroos. The Monotremata, the egg-laying mammals, are the Ornithorhyncus and the spiny ant-eater; the former of which, with its otter-shaped body and duck bill, is regarded as the most curious of existing mammalia. It is not certain that the dingo, or wild dog, is a native of Australia, although he is a characteristic mammal at the present time. Among the bats are some which attain great size and are called flying foxes, and which feed on fruits; others of smaller size live on insects. The bird fauna has numerous species. Among the larger birds are the emu, the eagle, and the black swan. The lyre bird is remarkable for its peculiar plumage. Paradise birds, cockatoos, parrots, paroquets, snipe, quail, pigeons, ducks, plovers, falcons, honeysuckers, scrub birds, mound makers, shrikes, weaver finches, kingfishers, frogmouths, and flower peckers are all abundant.

The reptiles of Australia are less distinctively peculiar than the birds and mammals. No families of snakes are confined to this continent, but there are some peculiar genera of Pythonidæ and Elapidæ, to which latter family fully two-thirds of the snakes of Australia belong. These are poisonous; so that Australia has more poisonous snakes in proportion to the total number than has any other region. In eastern Australia about half the snakes are poisonous, but in other parts the ratio is not so high. The number of species increases very rapidly from the southern part toward the northern with the increase in temperature. Lizards are numerous; three of the eight families occurring being peculiar to Australia. Tailed amphibians are not found in Australia, but 11 families of toads and frogs are present. There is only one family of fish peculiar to the waters of Australia, but many genera are found there which do not occur elsewhere. Australia is relatively poor in insect life. The butterflies are by no means numerous; in South Australia there are less than 35 species, although in Queensland there are over 100. This continent is much richer in beetles than in butterflies, the longicorns being especially abundant.

**Mineral Resources.** There are few countries in the world which are endowed with such a diversity of large mineral deposits as Australia. The total area of the Commonwealth in square miles is 2,974,581, while its population, according to the decennial census of April 3, 1911, is 4,455,005 (exclusive of full-blooded aboriginals), or 1.49 persons per square mile. The total value of the mineral production to Dec. 31, 1911, was £784,706,891.

This total of £784,706,891 is shared by the states as follows: New South Wales, £216,146,025 (of which coal, £65,427,673, gold, £58,760,846, silver and lead, £56,476,104); Victoria, £293,462,072 (of which gold, £289,663,989); Queensland, £99,726,118 (of which gold, £73,739,851); South Australia, £29,761,866 (of which copper, £27,285,052); Western Australia, £107,569,275 (of which gold, £103,850,486); Tasmania, £35,176,277 (of which tin, £11,429,499, copper, £9,816,537); Northern Territory, £2,865,258 (of which gold, £2,043,017). The total value of mineral production in 1911 was £23,480,211, compared with £23,215,191 in 1910 and £23,045,162 in 1909.

The present position of Australia, commercially, is largely due to the discovery of gold, the development of the other industries being, in a country of varied resources, a natural sequence to the acquisition of mineral wealth. The first definite record of the discovery of gold in Australia is a note by James McBrien, assistant surveyor, in a field book which he used while making a survey of the Fish River (New South Wales) between Rydal and Bathurst. The note is dated Feb. 15, 1823. Mention is also made in the early records of New South Wales of several other finds, but it was left for Count Strzlecki (in 1839), and the Rev. W. B. Clarke (in 1841) to demonstrate its existence in payable quantities, which was further substantiated by E. H. Hargraves' discovery in April, 1851, of Lewis Ponds and Summer Hill Creek. The first discovery of gold in Victoria was probably that made by W. Campbell at Clunes in March, 1850. In July, 1851, it was

announced that L. J. Nichel had found gold in the Yarra Ranges, and James Esmond in the Pyrenees Mountains. A few months thereafter many other noted fields in Victoria were opened up, and the gold fever took possession of Australia. The first find in South Australia is believed to have been in 1846, and in Tasmania in 1849. The rush to Canoona, in Queensland, took place in 1858, and though it turned out a failure, it led to the opening of payable fields about the time (1859) of the severance of that territory from New South Wales. Gold appears to have been found in Western Australia as early as 1848, but the first gold field, Kimberley, was not proclaimed until 1886, and the second, Yilgarn, not until 1888. In September, 1892, Bayley made his famous discovery at Coolgardie, and gold production progressed by leaps and bounds until 1903; since then, though the gold mines of Western Australia continue to be the richest in Australasia, their output has gradually declined. It was in 1903 that the maximum output of the Commonwealth was obtained, £16,294,684, of which the share of Western Australia was £8,770,719; the other states obtained their greatest yields as follows: New South Wales, £2,660,946, in 1852; Victoria, £12,214,976, in 1856; Queensland, £2,871,578, in 1900; South Australia (not including Northern Territory), £76,025, in 1904; Tasmania, £327,545, in 1899; Northern Territory, £111,945, in 1881. In the Commonwealth the total gold raised up to the end of 1911 was valued at £536,196,981. The value of the gold produced in each state in 1911 and from the beginning of mining to the end of that year is shown in the following table:

| State | In 1911 | To end of 1911 |
|---|---|---|
| New South Wales | £769,353 | £58,760,846 |
| Victoria | 2,140,855 | 289,663,989 |
| Queensland | 1,640,323 | 73,739,851 |
| South Australia | 15,000 | 892,810 |
| Western Australia | 5,823,075 | 103,850,486 |
| Tasmania | 132,108 | 7,245,982 |
| Northern Territory | 30,910 | 2,043,017 |
| Commonwealth | £10,551,624 | £536,196,981 |

The first discovery of silver in Australia was probably in 1839 in New South Wales, and the Wheal Gawler mine, near Glen Osmond, South Australia, opened in 1841, was probably the first silver mine worked in the Commonwealth. Silver has since been discovered in all the states, either alone or in the form of sulphides, antimonial and arsenical ores, chloride, bromide, iodide, and chloro-bromide of silver, and argentiferous lead ores, the largest deposits of the metal being found in the last-mentioned form. The largest silver mines are in New South Wales, the output of the other states being comparatively small. Up to 1882 the quantity of silver won was very limited, but in that and the following year extensive discoveries of the metal—associated principally with lead—were made in various parts of New South Wales, notably at Broken Hill and Silverton. The Broken Hill field extends over 2500 square miles of country, and has developed into one of the principal mining centres of the world. The lode is the largest yet discovered, and varies in width from 10 to 200 feet. The yield, including the silver lead locally produced and the concentrates exported, of the Broken Hill mines alone, from their inception to Dec. 31, 1911, was over £64,600,000, and the dividends and bonuses paid to the end of that year amounted to £14,554,185. The mine output of silver and lead in the Commonwealth to the end of 1911 was valued at £65,849,880.

Copper in Australia was first discovered at the Kapunda mine in South Australia in 1842. From 1846 copper mining may be said to have been one of the leading industries of that state, the output to the end of 1911 amounting to £27,285,052; for the year 1911 the output was valued at £332,500. In 1911 Queensland held first rank as a copper-producing state, with an output of £1,151,351; Tasmania was second, with £408,649. The production of the Mount Lyell mine in Tasmania has declined in recent years. The output in the Commonwealth to the end of 1911 amounted to £59,149,716, and in that year £2,564,278. The fluctuation in the market value of this metal was for some time a check to the industry, and many of the low-grade mines were compelled to close down.

Tin was first discovered, in New South Wales, probably in 1851. It exists in all the states, but Tasmania contains the richest deposits—the Mount Bischoff being the most celebrated tin mine in Australia. Queensland and Western Australia also possess rich deposits. The value of the tin won in Australia up to Dec. 31, 1911, was £30,227,626, and in that year £1,209,973 (£513,500 in Tasmania, £307,847 in Queensland, and £307,089 in New South Wales).

Iron is distributed throughout the Commonwealth, but want of capital has to a great extent interfered with the progress of the industry. In New South Wales extensive deposits of this ore exist in the Mittagong, Piper's Flat, Goulburn, Queanbeyan, and Port Stephens districts, and at Carcoar and Cadia.

Among the other metals and metalliferous minerals found in the various states may be mentioned aluminium, antimony, bismuth, manganese, platinum, tellurium, lead, mercury, molybdenum, titanium, wolfram, nickel, cobalt, chrome iron or chrome ore, zinc ores, and radio-active ores. The zinc in New South Wales is usually associated with silver, lead, and copper. For many years attention was directed by the

MINERAL PRODUCTION OF THE AUSTRALIAN COMMONWEALTH IN 1911

| State | Gold | Silver and lead | Copper | Tin | Zinc | Coal | Total (incl. other) |
|---|---|---|---|---|---|---|---|
| New South Wales | £769,353 | £2,652,548 | £590,102 | £307,089 | £1,414,890 | £3,167,165 | £9,405,301 |
| Victoria | 2,140,855 | ..... | 2,088 | 3,417 | ..... | 301,142 | 2,463,865 |
| Queensland | 1,640,323 | 23,460 | 1,151,351 | 307,847 | ..... | 313,998 | 3,658,738 |
| South Australia | 15,000 | ..... | 332,500 | ..... | ..... | ..... | 473,604 |
| Western Australia | 5,823,075 | 15,002 | 78,118 | 55,220 | 189 | 111,154 | 6,105,853 |
| Tasmania | 132,108 | 253,361 | 408,649 | 513,500 | ..... | 26,214 | 1,349,497 |
| Northern Territory | 30,910 | ..... | 1,470 | 22,900 | ..... | ..... | 59,353 |
| Commonwealth | £10,551,624 | £2,767,276 | £2,564,278 | £1,209,973 | £1,415,169 | £3,919,673 | £23,480,211 |

Broken Hill mines of New South Wales to the production of a high-grade zinc concentrate from the sulphide ores, but with only fair success. This difficulty was, however, overcome by the dry magnetic separation plant. The zinc output of New South Wales in 1911 amounted to £1,414,980, almost the entire production of the Commonwealth.

Coal was first discovered in New South Wales in 1797, at Coalcliff, on the coast to the north of Wollongong. Later in the same year Lieutenant Shortland discovered the Hunter River, with the coal beds situated at its mouth. It was not, however, until 1826 that coal mining really began. Coal is also mined in Queensland, Victoria, Tasmania, and Western Australia, but the quantity is small compared with the output of New South Wales, which to the end of 1911 was valued at £65,427,673, while that of the Commonwealth was £74,151,686. The total produced in 1911 was 10,550,127 tons, valued at £3,920,672.

The name "kerosene shale" has been applied to a variety of torbanite, cannel, or boghead mineral which occurs in a number of localities in New South Wales. The name "kerosene shale" is, however, an unsatisfactory one, because the mineral has little or none of the character of shale. The output of shale from the mines of this state in 1911 was valued at £36,980.

Of the other non-metalliferous substances, the gems and gemstones take first place. They have been discovered in various parts of Australia, but systematic search has been made principally for the diamond and the noble opal. Diamonds are found in New South Wales, Queensland, and South Australia, but only in the first-named state have any attempts been made to work the diamond drifts, the output to Dec. 31, 1911, being £118,407. Noble opal to the value of £1,295,100 was won in New South Wales from 1890 to 1911. Other gemstones, including the sapphire, emerald, oriental emerald, ruby, amethyst, garnet, chrysolite, topaz, onyx, and zircon, have been found in the various states, but they are not mined to any extent. Plumbago exists in New South Wales and Western Australia; bitumen in Victoria and New South Wales; elacterite, or elastic bitumen, in New South Wales and South Australia.

Common rock salt has been found in rock crevices in several parts of New South Wales, but is not known to exist in quantities sufficiently large to be of commercial importance. Large quantities of salt are obtained from the salt lakes in South Australia.

Marble is found in many parts of New South Wales, Victoria, South Australia, and Tasmania. In the former state quarries have been opened up in several districts, and some very fine specimens of stone obtained.

Limestone is mined in New South Wales and is largely used for the manufacture of hydraulic cement, as well as for fluxing purposes in smelting works. Limestone is also mined in Queensland, South Australia, Tasmania, Victoria, and Western Australia, but is used mainly for fluxing purposes. The production of Portland cement in New South Wales in 1911 was valued at £315,569 (not included in figures given for total mineral output).

**Agriculture.** In the western half of Australia, save at favored points along the coast, the rainfall is too scant to justify cultivation. The value of the rain is greatly lessened, moreover, by the fact that it falls in torrents and is mostly carried away at once by the watercourses. Surface streams for irrigation are not plentiful, but there is an unusually large number of subterranean currents; many artesian wells have been bored, particularly in South Australia and western New South Wales and Queensland, and numerous localities have thus been brought under successful cultivation. But as yet most of the western half of Australia lies untouched, while most of the eastern half resembles the western plains of the United States half a century ago, being given over entirely to grazing.

This eastern region has proved second to none anywhere in adaptability to sheep raising. Even the forest areas afford excellent pasturage; and the winters are so mild as not to interfere with grazing the year round. The only serious drawback is an occasional drought. For several years Australia has led the world as a wool producer, and her sheep have been her greatest source of wealth. The highest number of sheep ever reported was in 1891, when the total amounted to 106,421,068, the share falling to New South Wales alone being 61,831,000. Owing to prolonged drought the number fell to 72,040,211 in 1901, and 53,668,347 in 1902. Since then there has been a marked recovery, and at the end of 1911 the number of sheep in the Commonwealth was 93,003,521. Sheep are raised mainly for their wool, the total production of which (in the grease) amounted to 543,495,000 pounds in 1891, 509,902,000 pounds in 1901, 522,062,000 pounds in 1905, and 768,572,533 pounds in 1911. The breed of sheep is steadily improving, as is shown in the increase of the average weight of clip per sheep from less than 4 pounds in 1861 to a little over 7 pounds in 1905, about one-half pound more than in the United States. Formerly little or no mutton was exported, due to the breed of sheep being too valuable as a wool producer and the distance from European markets. But with the improvement of the cross-breeds, which are grown for table use, and the discovery and application of a process of cold storage of the meat for transportation, an export trade has been established which is assuming considerable dimensions.

Cattle are no less favored by the Australian climate than sheep. Queensland and New South Wales are the great cattle-raising states, the former having 42.89 per cent of the total in 1911 and the latter 26.93 per cent. The number of cattle in the Commonwealth increased from 3,724,813 in 1865, to 11,767,488 in 1895. By 1900 the number fell to 8,640,225, but increased to 11,744,714 in 1910 and 11,828,954 in 1911. The exportation of cold-storage beef is much greater than of mutton and is constantly increasing. Dairy farming has been carried on in Australia from a very early period in its settlement, but its mercantile importance began with the manufacture of butter by machinery in the early eighties. Originally the butter factories were mostly private concerns, but they have been superseded by factories owned coöperatively by the farmers. This transformation was largely due to government aid and encouragement. Thus New South Wales engaged the services of a dairy expert, and caused the importation of representative dairy breeds from England. Improved methods of shipping the product have greatly aided the industry. In 1904 there were 1,551,000 dairy cows in the Commonwealth, and in 1911 2,120,659; in the latter year 211,577,745 pounds of butter and 15,886,712 pounds of cheese

were produced, by far the greater part in New South Wales and Victoria. The raising of swine, which is carried on largely in connection with dairy farming, is a big industry and is yearly growing. Horses are bred mainly for local purposes. In 1905 their total number in the Commonwealth was 1,674,790 and 2,279,027 in 1911.

During the decade preceding 1891, in which there was a remarkable growth in sheep raising, land cultivation increased but slightly; but in the subsequent decade the increase was enormous. A change from the pastoral to the agricultural stage was taking place, similar to the transformation on the western plains of the United States. The rate of increase of cultivated land from 1861 to 1901 was twice that of the increase of population; and the area under crop increased from 8,812,463 acres in 1900–01 to 12,107,017 in 1911–12.

the coast of Queensland, and all kinds of temperate-zone fruits farther southward; while the orange, lemon, and fig thrive along almost the whole of the eastern shore line, even as far south as Victoria. The part of the land so far cultivated is but a minute portion of that which is available. Against the disadvantage of remoteness from the world's market, it has the advantage of producing fruits at a season when there is no competition from northern countries.

The different state governments have sought to encourage the development of the crown lands, and the state laws have been adapted to the nature and possibilities of the land and the varying desires and financial conditions of the settler. The terms for acquiring new lands include various kinds of conditional purchases, the instalment plan being in vogue. Sometimes residence is exacted. Certain lands

ACREAGE OF PRINCIPAL CROPS AND TOTAL ACREAGE, 1911–12

| State | Wheat | Oats | Corn | Barley | Potatoes | Vines | Fruits | Sugar cane | Hay | Green forage | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| New South Wales | 2,379,968 | 70,943 | 167,712 | 10,803 | 43,079 | 8,231 | 48,385 | 13,907 | 651,866 | 211,693 | 3,628,513 |
| Victoria | 2,164,066 | 302,238 | 18,223 | 53,541 | 47,692 | 24,093 | 59,985 | .... | 860,205 | 75,177 | 3,640,241 |
| Queensland | 42,962 | 557 | 153,916 | 1,634 | 7,688 | 1,371 | 16,817 | 130,376 | 61,299 | 93,049 | 526,388 |
| South Australia | 2,190,782 | 107,881 | 97 | 40,643 | 7,412 | 23,986 | 23,214 | .... | 521,182 | 33,673 | 2,965,338 |
| Western Australia | 612,104 | 77,488 | 29 | 3,654 | 2,705 | 2,821 | 18,194 | ..... | 344,032 | 5,021 | 1,072,653 |
| Tasmania | 37,208 | 57,583 | .... | 6,081 | 21,818 | .... | 27,868 | ..... | 77,466 | 5,627 | 270,000 |
| Northern Territory | 2 | .... | 19 | ..... | .... | 58 | 13 | ..... | 18 | 19 | 375 |
| Federal Cap. Ter. | 742 | 167 | 69 | ..... | 69 | ..... | 48 | ..... | 2,220 | 181 | 3,509 |
| Commonwealth | 7,427,834 | 616,857 | 340,065 | 116,466 | 130,463 | 60,602 | 194,524 | 144,283 | 2,518,288 | 424,440 | 12,107,017 |
| 1910–11 | 7,372,456 | 676,688 | 414,914 | 108,424 | 151,515 | 59,114 | 185,156 | 155,542 | 2,258,405 | 374,862 | 11,893,838 |

PRODUCTION, 1911–12

| State | Wheat | Oats | Corn | Barley | Potatoes | Wine | Sugar cane | Hay |
|---|---|---|---|---|---|---|---|---|
| | bushels | bushels | bushels | bushels | tons | gallons | tons | tons |
| New South Wales | 25,080,111 | 1,152,827 | 4,606,547 | 129,008 | 75,040 | 850,210 | 147,799 | 726,933 |
| Victoria | 20,891,877 | 4,585,326 | 792,660 | 1,024,584 | 119,092 | 983,423 | ..... | 1,032,288 |
| Queensland | 285,109 | 5,783 | 3,637,562 | 15,369 | 13,087 | 57,358 | 1,534,451 | 94,553 |
| South Australia | 20,352,720 | 1,349,480 | 1,490 | 702,855 | 22,668 | 2,921,597 | ..... | 605,239 |
| Western Australia | 4,358,904 | 961,385 | 401 | 37,011 | 9,312 | 162,559 | ..... | 299,695 |
| Tasmania | 659,615 | 1,504,633 | ..... | 148,009 | 62,164 | ..... | ..... | 107,684 |
| Northern Territory | 20 | .... .... | 400 | ..... | .. ... | ..... | ..... | 40 |
| Federal Cap. Ter. | 7,991 | 2,337 | 795 | ..... | 126 | ..... | ..... | 1,600 |
| Commonwealth | 71,636,347 | 9,561,771 | 9,039,855 | 2,056,836 | 301,489 | 4,975,147 | 1,682,250 | 2,868,032 |
| 1910–1911 | 95,111,983 | 15,428,456 | 13,044,081 | 2,226,368 | 399,851 | 5,866,049 | 2,000,758 | 3,175,851 |

In the three leading agricultural states—New South Wales, Victoria, and South Australia—wheat in 1911–12 constituted 65.59, 59.45, and 73.88 per cent, respectively, of the total area under crop. Only in Queensland and New South Wales is there sufficient rainfall to assure a crop of corn. The increase in wheat has been proportional to that of the total cultivated area, yet wheat is not a universally successful crop. In places droughts are frequent, and in many localities a long unbroken succession of the one crop has impoverished the soil. The average yield per acre for the Commonwealth has increased; it was 8 bushels in 1899 and about 12 bushels in 1909, while for the 10 years ended in 1912 the average was 10.48 bushels. Sugar cane is already by far the foremost crop of Queensland and is important in New South Wales. Australia now produces nearly all the sugar it needs. Wine, especially in Victoria and South Australia, is an important product. The cultivation of cotton has been tried in Queensland, but without marked success. Coffee and bananas are successfully grown on

may be acquired by annual lease. (For a more detailed statement, see articles on the different states.) All the states encourage suitable immigration. The various agents-general in London do their utmost to place before the inhabitants of the British Isles the advantages offered by Australia.

**Manufactures.** The establishment of a Commonwealth tariff, Oct. 4, 1901, gave to the Australian manufacturer the whole of Australia for a market instead of his own state, with the result that manufactures increased considerably. A successful effort has been made to establish the manufacture of iron, and large works are in operation at Lithgow, New South Wales. Many other industries, too, are showing great activity, notably boot manufacturing, Australia now making nearly all the boots and shoes her people require.

The progress of the manufacturing industry in Australia is somewhat irregular even in the more advanced states. The majority of the manufactories may be classified as domestic industries—i.e., industries naturally arising from

the circumstances of the population, or connected with the treatment of perishable products; but there is nevertheless a fair number of firmly established industries of a more complex character.

The value of the output of manufacturing industries (including the value of the raw materials) was as follows in 1907 and 1911:

| State | 1907 | 1911 |
|---|---|---|
| New South Wales | £37,231,012 | £54,346,011 |
| Victoria | 29,693,634 | 41,747,863 |
| Queensland | 11,209,515 | 15,675,662 |
| South Australia | 8,923,004 | 12,580,851 |
| Western Australia | | 5,311,086 |
| Tasmania | | 3,525,087 |
| Commonwealth | | £133,186,560 |

The value of the output in 1911 was made up as follows: Raw materials used, £79,041,576; fuel and light, £2,752,950; salaries and wages, £27,531,876; all other expenditure, interest, and profits, £23,860,158.

In 1911 there were 14,455 manufacturing establishments in the Commonwealth, employing (an average number of) 311,772 hands.

**Railways.** One of the most serious problems with which Australia has had to contend is inland transportation. Being an almost riverless continent, she is mainly dependent on artificial systems. These must largely precede civilization and open up the country for industrial development. The construction of railways through uninhabited or sparsely settled regions necessitated an enormous cash outlay in the face of a light estimate of immediate returns and an uncertainty as to the ultimate outcome. This burden and responsibility were assumed by the government itself. It has sought to further the development of the country and at the same time reap the benefits of the growth occasioned by the construction, ownership, and management of its own railways. As a result, in 1912 only 1779 miles of railway remained in private hands. The cost of construction and equipment of government railways, aggregating 16,898 miles, up to June 30, 1912, was £160,557,160. After the interest and running expenses have been paid, the balance, if any, goes to the consolidated revenue fund; on the other hand, if there is a deficiency it is met from the ordinary state revenue.

Victoria, in 1883, and subsequently South Australia, New South Wales, and Queensland, took the control of the railways out of the hands of the minister of railways or public works, and vested it in special commissions or commissioners. The government administration of railways has not been entirely free from grave faults and wasteful undertakings, yet it has advanced the settlement of the country in a way that could never have been expected from private enterprise. Thus, not only have cheap passenger and freight rates been secured, but new industries have been fostered by special freight rates, and various emergencies have been met, such as the transportation of sheep to watering places in times of drought. The employees enjoy an eight-hour law and receive comparatively high wages. For the year ended June 30, 1912, the gross revenue on government lines was £19,101,000, the working expenses £12,471,000, and the percentage of working expenses to gross earnings 65.29. The following table shows the total railway mileage, for government lines June 30, 1912, for private lines Dec. 31, 1911 (*a*, government lines; *b*, private lines available for general traffic; *c*, total open for general traffic; *d*, private lines used for special purposes only; *e*, grand total):

| State | *a* | *b* | *c* | *d* | *e* |
|---|---|---|---|---|---|
| New South Wales | 3,832 | 141 | 3,973 | 125 | 4,098 |
| Victoria | 3,622 | 14 | 3,636 | 37 | 3,673 |
| Queensland | 4,266 | 346 | 4,612 | 21 | 4,633 |
| South Australia | 1,939 | | 1,939 | 58 | 1,997 |
| Western Australia | 2,598 | 277 | 2,875 | 555 | 3,430 |
| Tasmania | 496 | 166 | 662 | 39 | 701 |
| Northern Territory | 145 | .. | 145 | ... | 145 |
| Commonwealth | 16,898 | 944 | 17,842 | 835 | 18,677 |

The mileage in 1912, the estimated population per mile, and the area (in square miles) per mile are shown below:

| State | Mileage | Pop. | Area |
|---|---|---|---|
| New South Wales * | 4,098 | 457 | 78.1 |
| Victoria | 3,673 | 372 | 24.1 |
| Queensland | 4,633 | 137 | 145.3 |
| South Australia | 1,997 | 216 | 196.0 |
| Western Australia | 3,430 | 105 | 339.4 |
| Tasmania | 701 | 287 | 39.6 |
| Northern Territory | 145 | 23 | 3,602.7 |
| Commonwealth | 18,677 | 260 | 166.7 |

* Including Federal Capital Territory.

**Telegraphs and Telephones.** The telegraph and the telephone systems are in the hands of the government, and progress in their development has been very rapid. The first telegraph for public use was established in 1854, from Melbourne to Williamstown. In 1871 there were about 11,500 miles of line, exclusive of railway telegraphs; in 1881, 25,470 miles; in 1901, 41,951 miles; in 1911, 44,013 miles of line, with 97,053 miles of wire. There are now north and south and east and west lines across the continent. A cable connects Darwin with Java, and through that with the European cables; another connection is made through a wire extending from Broome, Western Australia, to Banjuwangy. There is also the Pacific cable which connects Southport, Queensland, and Norfolk Island, thence to Fiji, Fanning Island, and Vancouver. The states on the mainland are all connected by electric telegraph, and Tasmania and New Zealand are connected to Australia by submarine cable.

Under the Wireless Telegraphy Act of 1905 the Postmaster-General has the exclusive privilege of establishing wireless-telegraphy stations within Australia; he is empowered, however, to grant licenses for the establishment and use of such stations. The first official wireless station was opened at Melbourne in February, 1912. Up to the end of 1912 the Commonwealth government had given approval for the erection of 19 stations, at or near the following localities: Port Moresby, Thursday Island, Cooktown, Townsville, Rockhampton, Brisbane, Sydney, Gabo Island, Melbourne, Hobart, Mount Gambier, Adelaide, Esperance, Perth, Geraldton, Broome, Roeburne, Wyndham, and Darwin. It was expected that all of these stations would be in operation by the end of June, 1913. Even-

tually the number of stations is to be increased to 32.

**Commerce.** Producing raw material so largely and manufactured products so little, Australia has an enormous foreign trade, exceeding all other countries in her per capita production and all except Belgium in the per capita value of her trade. One of the results of a federal tariff has been an increase in manufactories and the number of hands employed. Still so marked has been the increase in production, the external trade has increased and not diminished. The total oversea shipping entered and cleared at the ports of the Commonwealth is stated at 52,414 tons in 1831, 1,149,476 in 1861, 4,726,307 in 1891, 6,541,991 in 1901, and 9,984,801 in 1911. In 1911 the entrances aggregated 4,993,220 tons (of which 3,159,738 from British countries), and the clearances 4,991,581 (of which 3,215,158 to British countries); the percentage of British (including colonial) shipping was 74.18, and of foreign shipping 25.82. The interstate shipping entered and cleared in 1911 amounted to 23,107,747 tons, of which 6,528,328 were credited to New South Wales, 6,193,082 to Victoria, 4,313,759 to South Australia, 2,682,159 to Western Australia, 1,695,828 to Queensland, 1,623,716 to Tasmania, and 130,875 to Northern Territory.

The development of Australian foreign commerce may be seen in the following table, wherein are indicated total imports; domestic exports, or exports of Australian produce; reexports, or exports of foreign produce; total exports:

| | Tot. imp. | Dom. exp. | Reexp. | Tot. exp. |
|---|---|---|---|---|
| 1901 | £42,433,810 | £47,741,776 | £1,954,396 | £49,696,172 |
| 1907 | 51,809,033 | 69,816,500 | 3,007,747 | 72,824,247 |
| 1908 | 39,799,273 | 62,118,903 | 2,192,155 | 64,311,058 |
| 1909 | 51,171,896 | 62,843,711 | 2,475,125 | 65,318,836 |
| 1910 | 60,014,351 | 71,836,195 | 2,654,955 | 74,491,150 |
| 1911 | 66,967,488 | 76,205,210 | 3,277,048 | 79,482,258 |
| Specie and bullion included in figures above: | | | | |
| 1901 | £934,864 | £14,423,298 | £846,921 | £15,270,219 |
| 1907 | 1,834,200 | 9,713,190 | 1,474,270 | 11,187,460 |
| 1908 | 1,190,352 | 13,526,398 | 663,822 | 14,190,220 |
| 1909 | 1,056,375 | 7,580,158 | 1,100,126 | 8,680,284 |
| 1910 | 1,331,960 | 3,587,201 | 1,048,076 | 4,635,277 |
| 1911 | 1,969,581 | 10,403,796 | 1,643,290 | 12,047,086 |

The principal classes of imports, with values for 1911, are as follows (in parentheses is shown the value of imported products of the United Kingdom): Apparel, textiles, etc., including boots and shoes, £17,840,496 (£11,462,927); manufactures of metals, including machinery, £14,211,581 (£8,507,499); paper and stationery, £2,831,808 (£1,651,715); drugs, chemicals, fertilizers, etc., £2,178,600 (£896,921); alcoholic liquors, etc., £1,920,824 (£1,138,158); jewelry, timepieces, fancy goods, £1,755,583 (£611,355); leather and manufactures thereof and substitutes therefor, including rubber (excluding boots and shoes), £1,586,503 (£544,583); metals unmanufactured and partly manufactured, mainly pig iron and bar and rod iron (excluding specie and bullion), £1,519,133 (£928,172); earthenware, cements, glass, etc., £1,228,122 (£553,817); foodstuffs of animal origin, £816,915 (£266,740). The foregoing imports aggregate £45,889,565, of which the value of £26,561,887 represents produce of the United Kingdom, £5,106,062 of Germany, £4,894,909 of the United States, and £1,868,774 of France. The total imports (less specie and bullion) in 1911 amounted to £64,997,907, of which £32,365,588 (49.80 per cent) produce of the United Kingdom, £9,007,065 (13.68 per cent) of the United States, £6,363,248 (9.79 per cent) of Germany, £2,268,692 (3.49 per cent) of France, and £1,141,075 (1.75 per cent) of Belgium. In respect of point of shipment, 60.28 per cent of the imports in 1911 came from the United Kingdom, 11.93 per cent from the United States, and 6.82 per cent from Germany.

Of Australian produce, exported to the value of £76,205,210 in 1911, the more important classes of exports are: Animal substances, £29,714,471 (exclusive of animal foodstuffs, £9,015,505); vegetable foodstuffs, £11,910,303; metals unmanufactured, ores, etc., £10,674,748; specie, £8,210,595; oils, etc., £2,234,884. The exports of wool in the grease in 1911 were 578,823,623 pounds and of scoured and washed wool 71,770,640 pounds, the total valued at £26,071,193. The export of wheat was 55,147,840 bushels, and of flour 175,891 tons, representing 8,794,550 bushels of wheat.

Total imports and total exports in 1911 amounted to £66,967,488 and £79,482,258, respectively. Direct total imports from and direct total exports to the United Kingdom were valued at £39,499,011 and £35,309,982 (58.98 and 44.42 per cent); United States, £7,747,991 and £1,464,155 (13.45 and 1.84); Germany, £4,437,153 and £6,642,012 (6.63 and 8.36); Belgium, £2,007,557 and £6,111,943 (3.00 and 7.69); France, £614,045 and £8,180,084 (0.92 and 10.30).

**Banks.** The banks number 23, most of which have numerous branches throughout the Commonwealth, the total number of banking establishments in 1912 being 2043. The paid-up capital June 30, 1912, was £28,647,884, with reserved profits amounting to £12,419,733; total liabilities, £152,218,589 (deposits £149,806,597); total assets, £165,771,256 (specie and bullion, £28,686,012). The savings banks are either government or quasi-government institutions. Their number, including branches and agencies, at the middle of 1912, was 1941; depositors, 1,736,004 (1,258,689 in 1907); deposits, £66,956,778 (£42,098,289 in 1907). The average amount per depositor in savings banks in 1912 was £38 11s. 4d., and per head of population, £14 8s. 4d. Of the deposits, £25,361,338 were in New South Wales and £19,662,465 in Victoria.

**Government.** The Commonwealth of Australia is a federal state under the supreme authority of the crown of Great Britain, and was so constituted on Jan. 1, 1901, by the union of the British colonies of New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania. The provisions of the federal constitution will be found treated in detail under AUSTRALIAN FEDERATION.

**Defense.** The Australian states have always been opposed to the maintenance of a standing army; the principal ports are protected by fortifications, and forts have been constructed at King George's Sound and Thursday Island. On June 30, 1912, the strength of the Commonwealth military forces was 23,696, comprising: permanently employed, 2234; citizen soldiers, 21,127; volunteers, 121; and area officers, 213. Infantry numbered 10,148; light horse, 5613; field artillery, 1626; garrison artillery, 1954; and engineers, 1206. In addition to the 23,696, there were land forces to the number of 146,352, including 92,277 "senior cadets," and rifle clubs numbering 50,621 men. Total land forces, 168,048.

By an agreement of 1903 (subsequently amended), Australian naval defense has been maintained by ships of the Imperial navy, consisting of one first-class armored cruiser, three second-class cruisers, and five third-class cruisers. To take the place of this squadron it was decided in 1909 to create a naval force Australian in character. By June, 1912, three destroyers, each of 700 tons' displacement, were in commission. The battle cruiser *Australia*, commissioned in 1913, has a displacement of about 19,200 tons, 26 knots' speed, an 8-inch armor belt amidships, and a 4-inch belt at the ends, and an armament of 8 12-inch and 16 4-inch guns, and 5 torpedo tubes. The second-class cruisers *Sydney* and *Melbourne* arrived in Australian waters in 1913, while a third cruiser of the same class, the *Brisbane*, was under construction. In 1913 the British Admiralty presented the Commonwealth with the cruiser *Pioneer*. While on the Australian station the warships are under the exclusive control of the Commonwealth in time of peace, but pass under Imperial control if required for war purposes. A navy yard is maintained at Sydney, and a naval college is to be established on federal territory at Jervis Bay. On June 30, 1912, the naval forces numbered 4969, of whom 3983 were reserves.

**Finance.** The different state governments of Australia have ventured farther into the industrial field than any of the older governments of the world, in consequence of which their annual revenues and expenditures attain a disproportionately large figure. The consolidated revenue of the Commonwealth increased from £11,296,985 in 1901–02 to £15,019,034 in 1907–08 and £20,548,520 in 1911–12; while the expenditure in 1907–08 was £6,162,129 and in 1911–12 £14,724,097. Per capita expenditure in the latter year, £3 4s. 6d. About two-thirds of the revenue is derived from customs. The surplus of revenue over expenditure is apportioned among the states. The Commonwealth debt, contracted in 1911 and 1912, amounted at the middle of the latter year to £6,371,847.

The total state revenues increased from £34,867,646 in 1907–08 to £41,278,034 in 1911–12, while the expenditure rose from £32,502,163 to £40,858,581. Per capita expenditure of the states in the latter year, £8 18s. 10d. Revenue and expenditure, respectively, of the several states in 1911–12: New South Wales, £15,776,816 and £15,277,001; Victoria, £10,009,796 and £9,999,342; Queensland, £5,989,347 and £5,965,692; South Australia, £4,450,739 and £4,450,739; Western Australia, £3,966,673 and £4,101,082; Tasmania, £1,084,663 and £1,064,725. The gross public debt June 30, 1912, £277,124,095; sinking funds, £5,701,767; net debt, £271,422,328; net debt per capita, £58 10s. 3d. Of the total net debt the share of New South Wales was £99,398,654; Victoria, £59,605,685; Queensland, £47,053,186; South Australia, £31,118,574; Western Australia, £23,364,790; Tasmania, £10,881,489. For further financial details of the states, see separate articles.

The foreign indebtedness of Australia appears still greater when the fact is considered that British capital has been put into private undertakings within the states to an enormous extent.

**Population.** The estimated population of Australia at the end of 1788, the year of the first settlement, was 859 (not including aboriginals); at the end of 1800 it was 5217; in 1825 it had increased to 52,505; in 1840, 190,408; in 1850, 405,356; in 1860, 1,145,585; in 1870, 1,647,756. The census of 1881 showed a population (exclusive of full-blooded aboriginals) of 2,250,194 (with a masculinity, i.e., number of males per 100 females of 117.35); census of 1891, 3,174,392 (115.89); census of 1901, 3,773,801 (110.14); census of April 3, 1911, 4,455,005 (107.99). The increase per cent in the decade ended with 1860 was 182.61; 1861–70, 43.84; 1871–80, 35.43; 1881–90, 41.22; 1891–1900, 19.48; 1901–10, 17.52. The population by states in 1901 and 1911 was as follows:

| State | Sq. miles | Pop. 1901 | Pop. 1911 |
|---|---|---|---|
| New South Wales..... | 309,460 | 1,354,846 | 1,646,734 |
| Victoria . ..... | 87,884 | 1,201,070 | 1,315,551 |
| Queensland.. ..... | 670,500 | 498,129 | 605,813 |
| South Australia . ... | 380,070 | 363,157 | 408,558 |
| Western Australia .... | 975,920 | 184,124 | 282,114 |
| Tasmania . ..... | 26,215 | 172,475 | 191,211 |
| Northern Territory.... | 523,620 | .. ... | 3,310 |
| Federal Cap. Ter..... | 912 | .. .. | 1,714 |
| Commonwealth... | 2,974,581 | 3,773,801 | 4,455,005 |

The total population at the census of 1921 was 5,426,008.

The foregoing table does not include full-blooded aboriginals. Such of these as were living in a civilized or semi-civilized condition in proximity to whites were enumerated at the 1911 census and numbered 19,939. The total number of aboriginals is unknown, but a general opinion that it was about 150,000 long prevailed. Recent estimates, however, place the total at less than 100,000. Thus, in his report of June, 1910, the Queensland chief protector of aborigines estimates the total at 74,753, distributed as follows: New South Wales, 6897; Victoria, 256; Queensland, 20,000; South Australia (including Northern Territory), 20,600; Western Australia, 27,000. It is believed that the aboriginals are gradually decreasing in number. The last aboriginal in Tasmania died in May, 1876.

The immigrant races consist mainly of natives of the United Kingdom and their descendants. The population of Australian born has in recent years increased rapidly, and at the 1911 census, out of a total of 4,424,537 persons whose birthplaces were specified, 3,667,672, or 82.90 per cent, were Australian born, while of the remainder, 591,729, or 13.37 per cent, were natives of the United Kingdom, and 31,368, or 0.72 per cent, were natives of New Zealand; i.e., 96.99 per cent of the population were born either in Australasia or the United Kingdom. The other birthplaces most largely represented were: Germany, 32,990 (0.75 per cent); China, 20,775 (0.47); Scandinavia (Sweden, Norway, and Denmark), 14,706 (0.33); Polynesia, 3410 (0.08); British India, 6644 (0.15); the United States, 6642 (0.15); and Italy, 6719 (0.15). The total population of Asiatic birth was 36,442 (0.82 per cent), of whom 3474 were born in Japan.

The 1911 census showed 1,409,823 persons under 15 years of age, 2,854,753 persons 15 and under 65, and 190,429 persons 65 and over. The number of males was 2,213,035; females, 2,141,970. Persons never married numbered 2,783,543; married, 1,469,622; widowed, 191,743; divorced, 4500; not stated, 5597.

According to religion the population was classified as follows in 1911: Church of England, 1,710,443; Presbyterian, 558,336; Methodist,

547,806; Baptist, 97,074; Congregational, 74,046; Lutheran, 72,395; Church of Christ, 38,748; Salvation Army, 26,665; Seventh-Day Adventist, 6095; Unitarian, 2175; Protestant (undefined), 109,861; Roman Catholic, 921,425; Greek Catholic, 2646; Catholic (undefined), 75,379; others, 31,320 (total Christian, 4,274,414); Hebrew, 17,287; Confucian, 5194; Mohammedan, 3908; Buddhist, 3269; pagan, 1447; others, 5680 (total non-Christian, 36,785); indefinite, 14,673; no religion, 10,016; object to state, 83,003; unspecified, 36,114; total, 4,455,005.

According to occupation the 1911 census classified the people as follows: Professional, 144,611; domestic, 201,366; commercial, 286,687; transport and communication, 157,391; industrial, 562,337; primary producers, 586,148; indefinite (of independent means), 23,055; dependents, 2,449,986; unspecified, 43,424; total, 4,455,005. The primary producers included 284,700 persons engaged in agriculture; pastoral pursuits, 151,864; hunting, 4793; fisheries, 7805; forestry, 24,405; water conservation and supply, 6780; mining and quarrying, 105,804; total, 586,148. The dependents included 2,441.047 persons dependent on natural guardians, 8587 supported by voluntary and state contributions, and 352 under legal detention; total, 2,449,986.

The population of Australia has shown an excessive tendency to accumulate in the capital cities. In every state the population of the capital far outnumbers that of any other town therein and ranges between 21 and 46 per cent of the entire population of the state. The 1911 census shows that, out of a total population of 4,455,005, 1,694,400, or 38.05 per cent, were in the six capital cities and suburbs. This immense proportion of metropolitan population, implying a deficiency of primary producers in agriculture, indicates an imperfect economic development. As compared with Australia's 38.05 per cent, in New Zealand the percentage of the population of the capital (Wellington) on the total for the Dominion was 7.01. Population of the capital cities and their suburbs, with percentage on total of state (1911): Sydney (N. S. W.), 629,503 (38.19); Melbourne (Vic.), 588,971 (44.82); Brisbane (Qld.), 139,480 (23.03); Adelaide (S. A.), 189,646 (46.06); Perth (W. A.), 106,792 (37.86); Hobart (Tas.), 39,937 (20.87). Darwin, capital of Northern Territory, had 958 inhabitants, or 28.94 per cent of the total.

The statistics of town population as returned by the 1911 census, relate first to localities as defined by the residents therein and second to local government areas. No clearly defined boundary exists for a "locality," and the population given represents the number of persons who returned themselves as belonging thereto; a "local government area" is a district having fixed limits and incorporated for municipal purposes. The following figures show town population, first as a "locality" and second as a "local government area," April 3, 1911: Sydney (N. S. W.), 107,133 and 112,921; Melbourne (Vic.), 38,293 and 103,593; Prahran (Vic.). 25,489 and 45,367; Adelaide (S. A.), 32,981 and 42,294; Richmond (Vic.), 38,559 and 40,442; Perth (W. A.), 31,300 and 35,767; Brisbane (Qld.), 17,715 and 35,491; North Sydney (N. S. W.), 32,764 and 34,646; South Brisbane (Qld.), 21,332 and 34,478; Fitzroy (Vic.), 34,141 and 34,283; Brunswick (Vic.), 32,201 and 32,215; Balmain (N. S. W.), 31,961 and 32,038; Broken Hill (N. S. W.), 30,953 and 30,972; Marrickville (N. S. W.), 25,993 and 30,653; Bendigo (Vic.), 17,883 and 28,539; Hobart (Tas.), 27,505 and 27,526; Newtown (N. S. W.), 26,427 and 26,498; St. Kilda (Vic.), 25,499 and 25,334; Hawthorn (Vic.), 24,353 and 24,450; Redfern (N. S. W.), 24,275 and 24,427; Paddington (N. S. W.), 24,150 and 24,317; Leichhardt (N. S. W.), 24,139 and 24,254; Port Adelaide (S. A.), 3386 and 24,015; Essendon (Vic.), 10,087 and 23,740; Footscray (Vic.), 21,933 and 23,643; Unley (S. A.), 4397 and 23,773; Ballarat (Vic.), 38,686 and 22,017.

**Immigration.** The discovery of gold has done more than any other factor to attract immigration from abroad and from one state to another. An illustration of this is the remarkable development of Victoria in the decade following 1850 and of Western Australia from 1891 to 1901. The assistance rendered to immigrants by the state governments has been of importance, the states having borne the expenses in whole or in part of 725,983 immigrants up to the end of 1911. The conditions for acquiring land have been most favorable. The net immigration, or excess of arrivals over departures, has been as follows: 1861 to 1865, 31,762; 1866–70, 47,714; 1871–75, 40,326; 1876–80, 83,869; 1881–85, 148,367; 1886–90, 95,917; 1891–95, 15,660; 1896–1900, —945; 1901–05, —7177; 1906–10, 37,999; 1911, 46,695; total, 540,187. From 1861 to the end of 1911 the excess of arrivals over departures was 246,591 in New South Wales, 191,498 in Queensland, 126,404 in Western Australia, and 16,524 in South Australia; while in Victoria, Tasmania, and Northern Territory, there were excesses of departures over arrivals numbering respectively 32,195, 7626, and 1096. Australia is not so attractive as formerly to European settlers, while at the same time the Australians discourage Asiatic and other colored immigration. The immigration of Pacific Islanders ceased by law after March 31, 1904, and all agreements for their employment terminated on Dec. 31, 1906, when all Pacific Islanders found in Australia were deported. As the result of federal legislation limiting and ultimately excluding Kanaka labor in the cane fields, it has been found that it is quite possible to carry on the cultivation of sugar cane with white labor.

**Religion.** In the first days of Australian settlement the Church of England was the only church recognized and aided by the government. Later, state aid was extended to the Roman Catholics, Presbyterians, and Wesleyans, and offered to certain other denominations, which refused to accept it. The Church of England, which greatly outnumbers the others in all the states, has six dioceses in New South Wales, five in Victoria, four in Queensland, three in Western Australia, and one each in South Australia, Tasmania, and New Guinea. There is a General Synod, which convenes every five years. The Roman Catholic church has seven dioceses in New South Wales, four in Victoria, two dioceses and one vicarate in Queensland, two dioceses in South Australia, two dioceses and one vicarate in Western Australia, one diocese in Tasmania, and a vicarate in New Guinea. Formerly the Wesleyan Methodists, Primitive Methodists, and the United Methodist Free Church were all separate bodies. They are now united under the name of the Methodist Church of Australasia. For statistics of population by religion, see *Population.*

**Education.** In the early days of the states, education was provided for by state-aided religions, by organizations of various denominations, and by tuition fees exacted from the pupils. In time education was made secular and free. In Tasmania nominal fees are still charged, yet not required in cases of inability to pay. Religious instruction is provided for in state schools, but only outside of regular school hours. It is given by a clergyman instead of by regular teachers and is subject to the desire of parents. The Roman Catholics, however, maintain their own schools, in all the states, in which the teachers are members of the various religious orders. Education is compulsory in all the states, and the strict enforcement of the law in late years has produced a marked improvement in the attendance. The following table shows the number of state and private schools, pupils, and teachers, and the expenditure on state school maintenance in 1911:

| State | State schools | Teachers | Enrollment | Average attendance | Maintenance | Private schools | Enrollment |
|---|---|---|---|---|---|---|---|
| New South Wales | 3,125 | 5,980 | 223,603 | 160,776 | £1,048,584 | 756 | 60,968 |
| Victoria | 2,061 | 5,155 | 204,086 | 146,464 | 834,276 | 587 | 55,898 |
| Queensland | 1,232 | 2,733 | 91,624 | 70,194 | 351,942 | 141 | 16,100 |
| South Australia | 736 | 1,241 | 55,662 | 38,724 | 198,979 | 176 | 11,650 |
| Western Australia | 495 | 1,043 | 34,969 | 29,448 | 187,301 | 123 | 9,000 |
| Tasmania | 381 | 816 | 28,821 | 18,130 | 84,317 | 114 | 7,138 |
| Northern Territory | 3 | 3 | 85 | 60 | 629 | 1 | 50 |
| Commonwealth | 8,033 | 16,971 | 638,850 | 463,799 | £2,706,208 | 1,898 | 160,794 |
| 1901 | ..... | ..... | 638,478 | 450,246 | 1,816,296 | ..... | 124,485 |

High schools and grammar schools are maintained by the states and a number of scholarships are available in the various universities for the successful pupils. Throughout the Commonwealth there are a large number of colleges, providing secondary education, some of which are subsidized by the states, and the majority maintained by the various denominations. Technical education is now given in all the capitals and in most of the larger towns, and some of the technical colleges are amongst the finest educational establishments in the Commonwealth. University instruction is partly supported by the states. Sydney University was opened in 1851, Melbourne in 1855, and Adelaide in 1876. The University of Tasmania was founded at Hobart and Launceston in 1890. In 1911 a university was opened at Brisbane (Queensland) and in 1913 one at Perth, Western Australia.

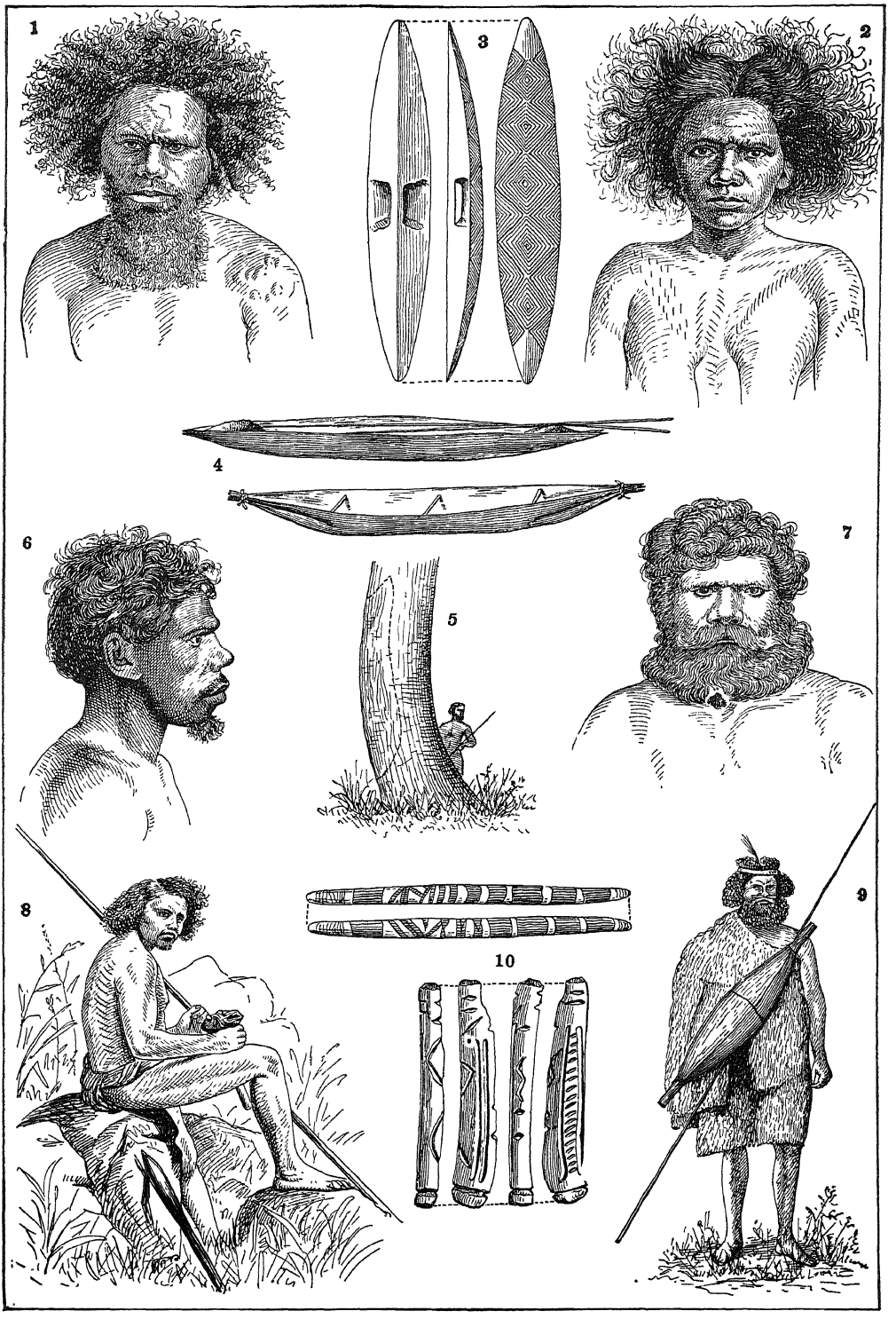
**State Activity and Social Conditions.** Especial interest attaches to Australia because of the wide scope of its state activities. In this respect Australia excels the older countries of the world, a number of its governmental ventures not having been elsewhere attempted, being generally held to be without the proper province of the state. It is, therefore, being closely watched, and the results attained are destined to have a far-reaching influence. The most important of these activities comprehend the construction, ownership, and control of railways and tramways; the construction and maintenance of highways; the surveying of all country roads; the ownership and control of telegraph and telephone lines as a part of the postal system; government savings banks, state banks; irrigation, including the boring of numerous artesian wells; supplying watering places for cattle and water to mines; assisting agriculture by granting reduced freight rates on government railways in the transportation of seeds and implements, or of cattle in time of drought; appropriating large sums for the furthering of agriculture in various other ways, such as the extermination of injurious animals and insects.

The states have also advanced loans to farmers and granted bounties to producers of butter and cheese and to fruit growers, etc. The paying of bounties is not limited to agriculture. They are liberally resorted to in all cases where it is believed that a new industry or a useful departure may be thus established. South Australia manufactures wine and also runs a cyanide plant. Western Australia has state batteries for treating the ores from her mines. New South Wales, Victoria, and South Australia have cold storage for perishable exports. Tasmania exports timber. Old-age pension systems adopted by New South Wales, Victoria, and Queensland were superseded July 1, 1909, by an act passed by the Commonwealth Parliament providing for old-age pensions throughout Australia. The number of pensions existing June 20, 1912, was 79,071. A Commonwealth act effective from Oct. 10, 1912, provided for an allowance of five pounds to every white woman who gives birth to a child. Claims for such allowance were granted to the number of 59,169 from Oct. 12, 1912, to April 26, 1913. The municipal activities have been very limited compared with those of the state.

Titled aristocracy and hereditary class distinctions are recognized in Australia as elsewhere in the British Empire. The British crown confers honors on public men and has initiated the practice of creating local baronetcies, which are hereditary class distinctions. There are no 'poor rates,' but the government often finds employment for the able-bodied. Numerous hospitals are maintained by the government. State aid is given to private philanthropic institutions, and there are a number of charities wholly supported by private philanthropy.

**The Aborigines.** The Australian aborigines, whom most ethnologists would rank as a separate race of mankind, are middle-sized, the average stature of Central Australian males being 166.3 cm.; they are less strongly and massively built than the European generally, long-headed, with depressed nose and wide nostrils, large mouth, thick lips, etc.; features suggesting now the Negroid, now the Caucasian type. The color of the skin is dark, running all the way from a yellowish tint to a pronounced chocolate-brown. The hair, with which the Australians are well provided on body and face, is black and straight or wavy generally, sometimes curly, but never woolly. Beneath an apparent physical unity all over the continent lurks considerable variation, which, like the ensemble of the Australians, may in part be due, as Ratzel

# AUSTRALIAN ABORIGINES




1. MAN OF NEW SOUTH WALES.
2. WOMAN OF NEW SOUTH WALES, showing scar-tattooing.
3. A SHIELD, front, back and side views.
4. BARK CANOES.
5. TREE, showing outline of canoe on bark, before cutting.
6. MAN OF QUEENSLAND.
7. MAN OF SOUTH AUSTRALIA.
8. MAN OF NORTH AUSTRALIA, with spear, axe and club.
9. NATIVE OF VICTORIA IN ORDINARY ATTIRE.
10. MESSAGE STICKS.

holds, to poor nutrition (the common condition of man in this habitat) and in part to prehistoric and historic race-intermixture with primitive South Asiatics, Malays, Papuans, etc. Huxley (1870) believed that one of the earliest races of prehistoric Europe was Australoid in type, and other ethnologists down to Keane (1896), Giuffrida-Ruggeri, and Schoetensack (1901) consider the Australians on somatic evidence related to the men of Spy and Neanderthal, in Quaternary Europe.

Linguistically the Australians present great internal variation. According to Father Wm. Schmidt's recent researches, the homogeneity formerly assumed to characterize all Australian languages prevails only in the southern half of the continent, where there is great uniformity, both in grammar and vocabulary. On the other hand, the very much smaller area extending from Roebuck Bay in the west to Cape Flattery in the east, and nowhere including territory south of the twentieth degree south latitude, except in the Arunta district, is occupied by tribes whose languages are not at all related to those of the southern group. Indeed, these North Australian languages differ very considerably from one another, revealing no lexical resemblance and very few grammatical ones. Even a classification based on the most general phonetic traits must recognize three distinct linguistic groups. So far as outside relations of Australian languages are concerned, a remote connection with Papuan tongues seems possible, while any affinity with the Malayo-Polynesian stock is out of the question. Sociologically, the most noteworthy things are the complicated marriage systems, the numerous and elaborate initiation ceremonies for youth, the corroboree-dance, and the totem system, recent study of which has shed much light upon primitive religion. In the way of inventions, their methods of tree climbing, the boomerang and the throwing stick, the waddy (club), their message sticks (with the beginnings of writing), and shamans' staffs, are to be mentioned. Their ground and tree drawings, rock pictures, etc., are of great interest. Pottery is unknown, and few of the rudiments of agriculture are present. The case against the Australians as a degenerate race is not made out. See TASMANIA.

**Exploration.** The fact that the earliest known manuscript maps of Australia are the work of French cartographers would suggest that French navigators were the first to visit those coasts. In 1521 there were indications of a southern continent on maps drawn by La Salle and the German Schöner. Ten years later the land mass begins to take more definite shape on the map of Orontius Finæus, of Provence, and by 1542, on the maps of Jean Rotz, the outline begins to conform distinctly to what we now know as Australia. There are, however, no other surviving records of voyages to that region, and it is practically certain that the Sieur de Gonneville and Capt. Jean Parmentier, the only Frenchmen who are known to have sailed the eastern seas thus early (1529), did not go beyond Sumatra. It is probable that the maps were drawn from information obtained from Portuguese sources, although the earliest extant account of a voyage which may have reached to Australia, that of the pilot Gaetan, was made in 1545.

The first authenticated voyage to Australia was made by the Dutch in 1606, although there are good reasons for thinking that five years earlier (1601) Manoel Godinho de Eredia, a learned and skillful Portuguese navigator, who had been commissioned by the Viceroy Ayres de Saldanha to verify reports derived from the Malayans of a large land toward the south, saw the continent. There is, however, no uncertainty about the voyage of the Dutch yacht, the *Duyfken* or *Dove*, which sailed from Bantam, in Java, Nov. 18, 1605, and coasted southward from New Guinea along the west side of the York Peninsula in the Gulf of Carpentaria to Cape Keerweer or Turnagain (14° S.). As he was back at Banda, in the Moluccas, in June, 1606, the commander of the *Duyfken* is supposed to have made the first recorded observation of the Australian coast about March of that year. Later in this same year Luys Vaez de Torres, who commanded one of the ships in a Spanish squadron which had been ordered from Callao, Peru, to make exploration in the eastern seas, became separated from the other vessels and continued his voyage westward, touching the east end of New Guinea, and then passing through the strait to which his name has been given. He touched the north coast of Australia at several points, but, finding only an unsafe shore and savage natives, he did not follow it far. During the next 30 years the Dutch pursued the exploration of the west coast of Australia with as much industry as the Portuguese had displayed in exploring that of Africa a century and a half earlier. In 1616 Dirk Hartog, in the *Endraaght*, discovered the land which is named after his ship, and the cape and roadstead to which his own name has been given. Jan Edels left his name on the west coast in 1619, and in 1622 the ship *Leeuwin* or *Lioness* reached the point on the west coast to which its name is still attached. Five years later Peter de Nuyts sailed along the south coast, and the same year Carpenter, in the Dutch service, entered the Gulf of Carpentaria. Abel Jansen Tasman was sent out from Batavia in 1642 to investigate the real extent of the Southern Land. Going wide of Cape Leeuwin, he hit upon the land to which he gave the name of the Governor-General at Batavia, Van Diemen's Land, which is now more generally known as Tasmania. Tasman kept on, and by sailing east proved that there was no connection between this land, which he supposed joined with the Australian continent, and the greater continent about the southern pole. He touched New Zealand and then returned to Batavia, having settled many of the geopraphical problems regarding this part of the world. Two years later Tasman probably continued his explorations in the neighborhood of the Gulf of Carpentaria, and, it was at this time that the name "New Holland" was given to the continent. This name continued to be the one most commonly used until the middle of the nineteenth century, when the name "Australia," probably first suggested by Matthew Flinders in his *Voyage to Terra Australis*, began to supplant it.

Capt. James Cook, commanding the *Endeavour*, was sent to Tahiti to observe the transit of Venus on June 3, 1769. This successfully accomplished, he continued to New Zealand, passing through the strait which bears his name. On April 19, 1770, he reached a land hitherto unknown to the map makers, and the naturalist of his party, Joseph Banks, found in the neighborhood of their anchorage so many specimens of plants entirely new to science that they named

the place Botany Bay. Cook coasted north, almost losing his ship on the Great Barrier Reef, but by keeping inside along the coast until he had passed Endeavor Strait he proved that this land was distinct from New Guinea. He gave the name of New South Wales to the land he had coasted, from some resemblance that he saw to the shores about the English Swansea. Returning to England, Cook was sent out again in 1772 to continue his explorations. Cook's reports led to talk of settling the southern continent and claiming it for England. In 1788 Captain Phillip landed some convicts at Botany Bay, nine miles from Sydney, and from this time on the English have steadily stretched out along the coasts and inland. In 1797 a naval surgeon named Bass started south with six men in a whaleboat from Port Jackson and proved the existence of open water, now called by his name, between the continent and Tasmania. One of Bass's companions, two years later, sailed eastward from Cape Leeuwin along the southern coast. At Encounter Bay he met a French ship and named the spot from the incident. He proceeded as far as Port Phillip. The Australian coast line was all practically determined when, in 1822, Capt. P. P. King completed his five-year voyages of investigation of the river mouths of the continent.

The successful exploration of the interior began with Lawson, Blaxland, and Wentworth's journey across the Blue Mountains of the east coast in 1813, to the fertile plateau beyond. The next year Evans discovered the Lachlan and Macquarie rivers and penetrated the Bathurst plains. Captain Sturt, in 1818–29, succeeded in dispelling the notion which had gained currency of a great inland sea, but in its place he substituted the more discouraging one of a vast lifeless desert. This seemed to be confirmed when, in 1847, the German, Leichhardt, who had previously crossed overland from New South Wales to Port Essington, in North Australia, started to traverse the continent from Queensland to Western Australia, and was never heard of again. In 1860 Burke and Wills, with an outfit furnished by the colony of Victoria, successfully crossed the eastern portion of the island from north to south, and between 1858 and 1862 John M'Douall Stuart performed the much more difficult feat of crossing from south to north, near the middle, in order to trace a course for the telegraph line which was erected shortly afterward. Between 1868 and 1874 John Forrest penetrated from Western Australia as far as the central telegraph line, and Ernest Giles did the same from the north between 1872 and 1876. These two routes were joined in 1897, when Daniel Carnegie successfully accomplished the journey by the direct route from the Coolgardie gold fields in the south to those of Kimberley in the north. Other expeditions under Gosse and Warburton in 1873 and H. V. Barclay in 1878 added materially to the knowledge of the country west of the central telegraph line. Lake Eyre was explored by Gregory in 1901–02, and in the latter year the continent was traversed from Fowler Bay in the south to Cambridge Bay on the north coast by Maurice and Murray. See AUSTRALIAN FEDERATION; WAR IN EUROPE.

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**AUSTRA'LIAN ALPS.** See AUSTRALIA, *Topography*.

**AUSTRALIAN ASH.** See FLINDERSIA.

**AUSTRALIAN BAL'LOT.** See BALLOT.

**AUSTRALIAN BEECH.** See GMELINA.

**AUSTRALIAN FED'ERA'TION.** On Jan. 1, 1901, the five Australian colonies of the United Kingdom, together with Tasmania, united to form a federal state under the name of the Commonwealth of Australia. The movement toward federation had its beginnings as early as 1849, though the first successful step toward consolidation was not made till 1883. The union of the Australian colonies was favored by the fact that in the main they possessed a homogeneous population, with the English-speaking race predominant, and almost identical political institutions. Economic differences were exceedingly acute between the colonies of New South Wales and its southern and highly developed industrial neighbor Victoria, on account of the latter's having adopted protection as a fiscal policy against the exports of the parent state. Nevertheless, this and other economic differences between different sections of the continent could not, and in the end did not, prove an insuperable obstacle toward the attainment of an object which so many other causes united to favor. As the result of a measure adopted by a convention at Sydney in November, 1883, the first important advance toward federation was made in 1885, when, on August 14, the Federal Council of Australasia was created by act of the Imperial Parliament. There were five colonies represented, Victoria, Queensland, Tasmania, Western Australia, and Fiji. New South Wales, South Australia, and New Zealand did not join. This body was endowed with certain limited powers in minor legislation, but in its very nature it was merely an advisory body, possessing no authority to impose its will upon the different colonies. It held eight meetings; and naturally ceased to exist with the inception of the Commonwealth. Its usefulness had died long before. In March, 1891, a National Convention, assembled at Sydney, declared in favor of Australian union and laid down the principles upon which the new Commonwealth should be based, the fundamental idea being that of a federal government with ample powers over foreign affairs, customs, and public defense, but circumscribed in its scope by the provision that all powers not expressly granted to the central government remain vested in the states. No definite result followed the action of the convention until January, 1895, when a conference of colonial premiers, meeting at Hobart, drafted an Enabling Act providing for the election of delegates to a Constitutional Convention, and the act was submitted to the legislatures of the various colonies.

On March 22, 1897, the Constitutional Convention met at Adelaide, whence it adjourned to Sydney and finally to Melbourne, completing its work on March 17, 1898. The constitution as drafted was submitted to the people of the colonies, and was adopted by a majority vote of nearly five to one in Victoria, of two to one in South Australia, and of over four to one in Tasmania. In New South Wales 71,595 votes were cast in its favor, and 65,228 votes against it; but as the Legislature had stipulated that a minimum of 80,000 votes or about one-third of the total electorate should be necessary for ratification, the constitution was declared rejected. In the above four colonies the vote for federation stood 219,712 to 108,363 against it. Queensland and Western Australia took no action in the matter. After certain changes demanded by New South Wales had been effected in the constitutional draft, the instrument was once more submitted to the people in 1899, and though opposition was still strong, the Federalists won by a vote of 107,420 to 82,741 in New South Wales, and by increased majorities in the other colonies that had previously taken action. Queensland also ratified the constitution. The total vote was 377,988 to 141,386, the majority being 236,602, as compared with 111,349 at the first vote. Early in 1900 the constitution was submitted to the Imperial Parliament at Westminster, and was adopted with but a single modification, to be noted hereafter. By the statute of 63 & 64 Vict. chap. 12 (which received the royal assent July 9, 1900), the five colonies which had ratified the constitution were merged into the new Commonwealth of Australia, with the provision that Western Australia should be admitted to the Commonwealth on ratifying the constitution. Western Australia ratified the constitution July 31, 1900, by a vote of 44,800 to 19,691. On Sept. 17, 1900, Queen Victoria signed the proclamation declaring that on and after Jan. 1, 1901, the people of New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania, should be united in a federal commonwealth, under the name of the Commonwealth of Australia. And on Jan. 1, 1901, the new Commonwealth was proclaimed in the capitals of the former colonies, now known as original states.

The constitution of Australia is modeled obviously upon that of the United States, in that it

is based upon the principle formally stated, that all powers not delegated to the central government are reserved to the states. During the process of constitution making, this principle encountered great opposition from those who favored a strongly centralized state, modeled upon the constitution of Canada. The legislative power of the Commonwealth is vested in a Federal Parliament composed of the sovereign of Great Britain, a Senate, and a House of Representatives. The sovereign appoints as his representative the Governor-General, who may summon, prorogue, and dissolve Parliament, which must meet, however, every year. The Senate is composed of six members from each of the states, elected at large for a term of six years. The members of the House of Representatives are chosen for three years and must comprise, as nearly as possible, twice the number of senators, but no state may have less than five members in the lower house. For the first Parliament New South Wales was apportioned 26 seats; Victoria, 23; Queensland, 9; South Australia, 7; Western Australia, 5; and Tasmania, 5; total, 75. (In 1913 the total number of seats remained the same, but New South Wales had 27 and Victoria 22.) Parliament has the power of increasing the membership of either house, but no state may be deprived of its absolute or proportionate representation without its consent. The qualifications for an elector to either house of Parliament are the same as those for an elector to the lower house in the different states. In defining the scope of the Federal Parliament the framers of the constitution did not show themselves so ardently in favor of state rights as to grudge it the exercise of wide powers. Profiting, on the contrary, by the experience of the United States in the matter of the conflict of state laws, and influenced, too, by the opposition of those who advocated a strongly centralized government, they included within the jurisdiction of Parliament such subjects as divorce, bankruptcy, and corporations, and prepared the way for the absorption of the colonial railways by the federal government. Closely summarized, the exclusive powers of Parliament are as follows: (1) Taxation, both direct and indirect, borrowing money on the public credit, currency, coinage, and legal tender; (2) defense; (3) the regulation of foreign and interstate commerce, including navigation, shipping, and interstate railroads, and the granting of uniform bounties on the production and exportation of goods (but each state may grant bounties for the encouragement of the mining industry); (4) banking and insurance carried on in more than one state; (5) bankruptcy, copyright, patents, trademarks and corporations; (6) marriage, divorce, parental rights and guardianship; (7) census and statistics, weights and measures; (8) external affairs, immigration and emigration, quarantine, the influx of criminals, naturalization, and the control of any race, other than the aborigines, requiring special legislation (this referring to the important question of Chinese and Japanese coolie labor); (9) posts, telegraphs, and telephones; (10) astronomical and meteorological observations, coast service, and fisheries; (11) industrial arbitration in questions involving more than one state, invalid and old-age pensions; (12) the service of criminal and civil process, and the establishment of judicial comity among the states; (13) the control of the railways for the purposes of national defense, the permanent acquisition of the railways with the consent of the states involved, and the construction of new railways; (14) finally, all legislation incidental to the execution of powers specifically delegated. Any state law that is in conflict with a law passed by Parliament, acting within its jurisdiction, is void.

Legislation may be initiated in either house, but money bills must originate in the House of Representatives. The Senate has no power to amend an appropriation bill, but may reject such measure. In case of a deadlock between the two houses lasting more than three months, as when the Senate persists in rejecting a bill repeatedly passed in the lower house, or in adding amendments which that house refuses to accept, recourse is had to a dissolution and to a general election, and if the deadlock continues in the new Parliament the two houses meet in joint session and decide the matter by a majority vote. The executive power is vested in a Governor-General, nominated by the crown, and in a council of not more than seven salaried ministers, appointed by the Governor-General and responsible to Parliament, of which they must be members. The judicial power is vested in a Federal Supreme Court known as the High Court of Australia, exercising original jurisdiction in cases involving treaties with other nations, or the representatives of foreign nations, or cases to which the Commonwealth is a party, or a state, or the residents of different states. It hears appeals from the minor federal courts and from the supreme courts of the states. No appeal may be taken from the decision of the High Court to the British Privy Council on questions involving the limits of the constitutional powers of the Commonwealth or of the different states, unless the High Court certifies that the question is one which ought to be determined by the Sovereign in Council. In all other cases, appeals lie to the Privy Council, subject to the rules of procedure established by the Australian Parliament.

The rights of the states are affirmed in the clause reserving to them all powers not delegated to the federal government. Their present constitutions continue in force, their laws are judicially recognized, and their territorial integrity and political influence are guaranteed by the provision that no amendment altering the boundaries of a state or reducing its absolute or proportional representation in Parliament is valid without the consent of the state; whereas an ordinary amendment to the constitution may be passed by a majority of both houses of Parliament, and ratified by the people of a majority of states, constituting at the same time a majority of the whole body of electors in the nation. New states may be carved out of one or more of the original states with their consent, and Parliament may prescribe conditions for the admission of new states into the union.

The Australian constitution, like the Constitution of the United States, upon which it is modeled, is the result of compromise between the principles of loose federalism and centralization. The former was undoubtedly favored by the great majority of people, but met with strong opposition from the powerful labor element, which was especially influential in New South Wales and Victoria, and succeeded in defeating the constitution at the first referendum.

The Commonwealth has been regarded by many students of politics as a step toward complete

Australian independence. The veto power lodged in the crown and the right to appoint the Governor-General of the Commonwealth are of only little importance as binding ties between the mother country and Australia, in view of the British theory of the relations of the executive toward the legislature. Practically the only bond between Australia and the Empire is the right of appeal from the courts of the Commonwealth to the Sovereign Council. In the constitutional draft submitted to the British Colonial Secretary, it was provided that no appeal should lie to the Privy Council except in cases involving the interests of some other part of the Empire. The British Colonial Office insisted upon the modification of this clause, and in the final act it was given the form already described. It is generally conceded, however, that in practice the tendency would be to restrict the exercise of the right to appeal to the utmost.

On Jan. 1, 1901, the birth of the new Commonwealth was signalized by appropriate ceremonies at Sydney. The Earl of Hopetoun was the first Governor-General, and he intrusted the formation of the first federal ministry to Sir Edmund Barton. The elections to Parliament were fought out on the tariff issue, and resulted in a majority for the Protectionist government. Parliament was opened on May 9 at Melbourne, which was designated as the temporary capital until the selection of a site for a federal district within the boundaries of New South Wales. A narrow policy of immigration was initiated in 1900 by the enactment of a law aiming at the absolute exclusion of Asiatics and the practical exclusion of European contract labor. After a prolonged struggle a tariff bill of protective character was passed in 1902. In the same year the Earl of Hopetoun was succeeded as Governor-General by Baron Tennyson, who in 1904 made way for Baron Northcote. Baron Northcote was succeeded in 1908 by the Earl of Dudley, who was succeeded in 1911 by Baron Denman. The parliamentary elections of December, 1903, which left the Protectionist and Free Trade parties about equally balanced, showed a remarkable growth of the Labor party, which stands practically for a modified socialism and the principle of a so-called "white Australia"—i.e., the complete exclusion of non-European races and a jealous restriction of the right of entry into the country. Sir Edmund Barton resigned in 1903, and there followed a rapid alternation of ministries based on changing combinations among the three parties. From April to August, 1904, the Watson Labor ministry was in power. The rigorous enforcement of the "white Australia" policy and the immigration laws, and the socialistic nature of much of the legislation of the ensuing period, brought a certain amount of strain into the relations between the Commonwealth and the Imperial government. The federal government was charged by the English press with pursuing a selfish policy in the matter of restricting population. A project formulated in 1905 by General Booth, head of the Salvation Army, for the colonization of 5000 English families in Australia, was soon abandoned on the ground that the Commonwealth had failed to lend any encouragement to the scheme. The Reed free-trade ministry, which was in office at the beginning of 1905, after an ineffective anti-socialist campaign, was defeated by a combination of the Labor and Protectionist parties, and a ministry of the latter character under ex-Premier Deakin succeeded. In view of the close relationship existing between the government of Great Britain and Japan, the government in December, 1905, carried an amendment to the immigration law permitting the temporary admission of Asiatic tourists, students, and merchants; the contract labor clause was also modified. In 1909 the Commonwealth and New South Wales entered into an agreement for the surrender to and acceptance by the Commonwealth of an area of about 900 square miles to constitute a federal territory wherein should be built the permanent federal capital. A proclamation was issued, Dec. 5, 1910, vesting the territory in the Commonwealth on and from Jan. 1, 1911. Most of the territory is in the Yass-Canberra district; a few square miles are at Jervis Bay, where several small acquisitions were made by the Commonwealth subsequent to the original cession; the total area ceded was stated in 1913 at 912 square miles. Work on the capital city, Canberra, was begun in 1913; the site is 204 miles from Sydney, 429 from Melbourne, 912 from Adelaide, 929 from Brisbane, and about 123 (or 96 by another route) from Jervis Bay. Pending the completion of Canberra, Melbourne continued the temporary capital of the Commonwealth. Consult Garran, *The Coming Commonwealth* (Sydney, 1897), Quick, *The Annotated Constitution of the Australian Commonwealth* (Sydney, 1901); Turner, *First Decade of the Australian Commonwealth* (New York, 1911).

**AUSTRALIAN GUM TREES.** See EUCALYPTUS.

**AUSTRALIAN LITERATURE.** Australia was not claimed for Great Britain until 1770, and the first settlements were penal. Then followed the sheep farmers and, on the discovery of gold in 1851, a horde of adventurers. By 1859, Australasia (Australia, Tasmania, and New Zealand) consisted of seven independent colonies. The period of national unity did not begin until 1901, when these states, except New Zealand, were federated under the name of the Commonwealth of Australia. Young Australia has not had time to develop a varied and mature literature of her own. She is just emerging from a position like that in which the United States found itself about a century ago—from the imitative period. Her first writers, who came midway in the nineteenth century, were Englishmen or Scotsmen bred at the public schools and at the universities, some of whom returned to the land of their birth; while several contemporary writers, though in some instances born in Australia, have settled in London. Hence by Australian literature in general we can mean no more than English literature inspired by the life and scenes in this island of the South Seas.

The early settlers carried out with them little volumes of their favorite poets, and in the loneliness of bush life began to write lyrics in imitation. Indeed, there is hardly an English or American poet of the nineteenth century whose voice has not been echoed in Australia—Wordsworth, Byron, Tennyson, Browning, Poe, and many others. But as time has gone on, Australian verse has more and more forgotten its models and has assumed local color. Its themes are taken from incidents of the town and the bush. The poets sing of the "burning wastes of barren soil and sand," or, in another mood, of "the sunlit plains extended" and "the won-

drous glory of the everlasting stars," or, as Kipling writes, "the thin, tin crackling roofs." Of the Australian singers of the nineteenth century, the earliest was Barron Field, Judge of the Supreme Court of New South Wales, who published at Sydney, in 1819, *The First Fruits of Australian Poetry*. Among succeeding verse makers were W. C. Wentworth, author of *Australasia;* J. D. Lang, Sir Henry Parkes, and Lionel Michael, author of *Songs without Music* (1857). A new period for Australian poetry began with Adam Lindsey Gordon and Henry Clarence Kendall. Gordon, born in the Azores, in 1833, educated at Oxford, emigrated to South Australia, in 1851, taking leave of England in lines imitated from *Childe Harold*. He became a horse dealer, horse trainer, and the best steeplechase rider in the colonies, as well as the strongest of the first generation of Australian poets. His life was particularly pathetic, and he died by his own hand, in 1870. Gordon published three volumes: *Sea-Spray and Smoke-Drift* (1867), *Ashtaroth* (1867), and *Bush Ballads* (1870). In his sporting poems and narratives, based on his own wild experiences, we first get at the heart of Australia. The horse and the rider he glorified in ballads that have the ring of Scott and Macaulay. The Byronic influence never left him. His despair reaches intense expression in *Whither Bound?* Kendall was born at Ulladulla, New South Wales, in 1842. There, in the lonely bush, he passed his boyhood. His life was saddened by an inherited love for drink, which he mastered only after years of struggle. He died near Sydney, after spending a year in a madhouse, in 1882. His first volume, *Songs and Poems* (1862), was followed by *Leaves from an Australian Forest*, containing his best work, and *Songs from the Mountains*. Of less force than Gordon, Kendall, "the national poet," sang with great beauty of the Australian hills, streams, and forests, in poems like "September in Australia," "The Hut by the Black Swamp," and "A Death in the Bush." He was the purest and most spontaneous poet of the group to which he belonged. The early Australian poets were an ill-fated race, who, after checkered, necessitous, and tumultuous lives, sank most of them untimely into early graves. An exception was Alfred Domett (1811–87), a successful and prosperous man, who rose to be Premier of New Zealand. Robert Browning, an early friend, joined Tennyson and Longfellow in praise of his work. He is said to be the subject of Browning's poem, "Waring." He is most favorably known by *Ranolf and Amohia* (1872), a narrative poem on a Maori subject. Charles Harpur (1812–68) was preëminently the poet of the bush, and has incomparably caught its atmosphere of weird melancholy in his poems, of which several volumes were published between 1835 and 1868. Include with Gordon, Kendall, Domett, and Harpur, James Brunton Stephens (1835– ), author of *Convict Once* (London, 1871), and many other poems, and the giants of Australian song are named. More recent verse compares favorably with most of what is being produced in England and America. It lacks, however, the simplicity, sincerity, and force of the older poets who voiced the wild and melancholy moods of their often ill-starred lives. The older singers cultivated literature "on a little oatmeal"; the later singers are better groomed, more presentable, and more prosperous,—often civil servants, editors, professors, or men of affairs, and their verse, if less moving, is more ambitious and el[illegible]rays with the where journalism is the stepping-st[illegible]he constructure, and a vigorous journalism is ch[illegible]all legislaof Australia. All the state capitals h[illegible]wers spedailies, some of them as wealthy and [illegible]t is in perous as the great English newspapers, [illegible]cting their columns most of the writers, espec[illegible] those still to be mentioned, have made the[illegible] start. The younger school of the later nineteenth and early twentieth centuries owes much to a brilliant journalist, devotedly Australian, Mr. J. F. Archibald (1858– ), of whom it is but right to speak in any account of present-day Australian literature. Ceaselessly urging upon his compatriots the choice of home scenes, themes, and characters for verse and story, he has been studious in helping and encouraging young literary aspirants, and many of the most talented writers of the day have first advanced under his ægis. Among more than 100 poets, recently dead or still at work, may be mentioned, somewhat arbitrarily perhaps, D. B. W. Sladen (1856– ), author of several volumes of poems, a critic who has done good service to Australian literature, and a prolific miscellaneous writer; Edward Dyson (*Rhymes from the Mines*, 1896); Charles Allan Sherard (*A Daughter of the South*, 1889); Alexander Sutherland (1852– ); E. B. Loughran (*'Neath Austral Skies*, 1894); J. B. O'Hara (*Songs of the South*, 1891); William Gay (*Sonnets*, 1896); George Gordon McCrae (1833– ), noteworthy for poems based on aboriginal legends, and a man of marked originality; W. P. Reeves (1857– ); Will Ogilvie (1869– ); Col. Kenneth Mackenzie; Bernard O'Dowd (1866– ); Roderick Quinn (1869– ); and Edwin J. Brady (1869– ), a writer of sea-songs. Victor Daley (1858–1905), by his *At Dawn and Dusk* (1897), represents a cosmopolitan element and expresses various moods that have nothing distinctive of his country about them. The two leading versifiers of to-day, judged by the wide circulation of their books, are Henry Lawson, only less known than Gordon and Kendall, and author of *While the Billy Boils*, etc., and A. B. Patterson (1864– ), whose *Man from Snowy River* (1895) and other books are redolent of the drover's track and the wanderings of the swagman. The women of Australia vie with their brothers for poetic laurels, nearly a quarter of the Stevens *Anthology* (see below) falling to their share. Certainly not the least of these, and perhaps the best, is Miss Louise Mack, who voices the Australian woman's attitude toward art and life in *Dreams in Flower*, and elsewhere. Other women, slightly earlier or later in time, are Miss Werner, Miss Castilla, Miss Jessie Mackay, and Miss Ethel Turner, the last named distinguished for child poems fine in form and feeling.

In Australian fiction—and the same is true of the earlier poetry—there was, until late in the nineteenth century, nothing distinctively native, save the subjects chosen—no different set of literary values, moods, or views of life. English eyes, nerves, and technique were, however, at work upon new material; and environment was subtly differentiating the colonial character from the home product. Australian literature to-day is presenting this new type of man, responsive to his new surroundings—less reverent, free from conventionality, less socially deferential than his British forebears, full of the zest of life, gay and buoyant on the whole, though sometimes imbittered by pioneer hardship, hardy, brave, a

little ruthless, with a freakish, wild, exaggerated humor, and a rapid wit that recall similar American traits. The earlier novelists had little distinctive literary personality; there was always the overshadowing presence of Dickens, Charles Reade, Bret Harte, or another. Before 1901 Australia had produced some 300 published volumes of novels and tales, not to mention unnumbered productions of the same kind that never survived newspaper appearance. Now more than 100 prose writers, mostly of fiction, are at work. The earliest novels appeared at Sydney from 1840 to 1850; they were melodramatic, with the escaped convict or the bushranger for hero. In a like capacity the gold digger appeared in the next decade to rival the picturesque cut-throat. At this time some passable work was done in fiction by Miss C. H. Spence, but Henry Kingsley, brother of Charles Kingsley, who went to the gold fields in 1853, and published *The Recollections of Geoffrey Hamlyn*, perhaps the best Australian novel written to the date of its appearance (1859), was really the father of Australian fiction. B. L. Farjeon's *Grif* (1869) is another notable novel, depicting Melbourne night life with a vividness worthy of Dickens. In 1870 (rewritten, and published in London, 1874) appeared what may be called a classic of Australian fiction, Marcus Clarke's powerful *For the Term of His Natural Life*, sole survivor of a host of convict novels, and the most lasting record in fiction of the convict system. Lord Rosebery has called it "the most terrible of all novels." It has been translated into several modern languages. Marcus Clarke (1846–81), primarily remembered for this novel, may here have parenthetical notice on the score of his excursions into general literature, which gave him a singular distinction in his day and country.

To return to fiction, bush ranging found its best chronicler in Charles Alexander Browne, better known by his pen-name, "Rolf Boldrewood." He was born in London in 1826, and was in turn squatter, magistrate, goldfields commissioner, and the strongest and most mature of Australian novelists. Beginning late in life, he turned the varied wealth of his colonial experience into fiction. His *Ups and Downs* (also called *The Squatter's Dream*) presented the life of the sheep breeders. It was *Robbery under Arms* (Sydney; London, 1888) that made and established the author's reputation, and can claim to be at once something like a work of art and a vivid, faithful transcript of the scenes, incidents, and temper of the wild, early days. There followed well-nigh a score of other full-size novels by this wonderfully fertile octogenarian, reflecting many sides of local life and character—the bush, the diggings, rural and urban scenes, in which are introduced all the representative social types. So true are his stories that they constitute an invaluable sociological museum; so vivid and lively are they that they are sure to be long read with delight. A. B. Peterson is novelist as well as poet, and in *An Outback Marriage*, published in the nineties, is of those who, if they abandon the bushranger, still keep to the bush. The tragedy and farce of the life there, its loves and jealousies, its illicit relations, and haphazard morals and manners, are reflected in the book just named. No better account of station life in the heart of Australia can be found than is afforded by this novel, though a score of good kindred stories are at hand. The vivid and rather crude pictures of the relations of Polynesians and whites, and of other phases of South Sea Island life, by Louis Becke (1857– ) will repay attention. They are for the most part stirring novels of adventure, some written in collaboration with the journalist, Walter Jeffrey, in the Stevenson or Conrad style, such as *By Reef and Palm* (1896), *Pacific Tales* (1897), *Wild Life in the Southern Seas* (1897), and *The Mutineer* (1899). Guy Boothby gained wide popularity with *The Beautiful White Devil* (1896) and *Dr. Nikola* (1896). Among present-day Australian novelists none has a greater vogue than Arthur Hoey Davis ("Steele Rudd"), whose picture of the Queensland small farmer is probably true, if not flattering, to that class the colony over. This author may be called the first of Australian humorists, a humorist of the broadest type. As in England and the United States, so in Australia, some very fine work in fiction has been done by women. Ada Cambridge (Mrs. G. F. Cross) is, perhaps, best known. At the age of 26 (1870) she went to Australia with her husband and has lived there ever since, mostly in the bush districts of Victoria. In *The Three Miss Kings* (1891) she conceived the notion of depicting the life of three girls, brought up in a bush home, and their subsequent career. Mrs. Cross has also succeeded admirably with the problem-novel, and now some dozen works of fiction stand to her credit. Mrs. Campbell Praed, born in 1851, a native of Queensland, has published about 25 novels. In their stern and pessimistic outlook they resemble the work of Hall Caine, Mrs. Dudeney, and Thomas Hardy. A typical novel of hers is *Longleat and Kooralbyn* (1887). Madame Couvreur, better known by her pen-name, Tasma, lived many years in Victoria. She returned to England in 1879, and 10 years later published *Uncle Piper of Piper's Hill*. She wrote two other good Australian stories—*In Her Earliest Youth* (1890) and *Not Counting the Cost* (1895). Miss Ethel Turner, already named among the poets, claims a place here also as the author of delightful "juveniles," notably of *The Seven Little Australians* (1894) and its sequel, *The Family at Misrule* (1895). Australian fiction and literature in general at present lack authors of outstanding distinction and ability. Literary energy and enthusiasm abound; the national and original note grows steadily clearer; and there is rich promise of future achievement.

Consult: Turner and Sutherland, *Development of Australian Literature* (New York, 1898); Byrne, *Australian Writers* (London, 1896); Martin, *Beginnings of an Australian Literature* (London, 1899); Sladen, *Australian Poets, 1788–1888*, an anthology (New York, 1890); *Australian Ballads*, in Canterbury Poets (London, 1885–90); *An Anthology of Australian Verse*, ed. Bertram Stevens (Sydney, 1906); Alfred Buchanan, chapters on literature in *The Real Australia* (London, 1907); *An Austral Garden: An Anthology of Australian Verse* (Melbourne, 1913).

**AUSTRALIAN OATS.** See RESCUE GRASS.

**AUSTRASIA,** ąs-trā'shȧ *or* -zhȧ (Med. Lat., from OHG. *ōstar*, eastern), or THE EAST KINGDOM. The name of the eastern possessions of the Merovingians, which extended, roughly speaking, from the boundaries of Thuringia and Bavaria to the rivers Meuse and Scheldt. Metz was its capital and Verdun its most western town. Its population was almost wholly Germanic. The

designation arose after the death of Clotaire I in 561. Under the Carolingians the name disappears. See BURGUNDY; NEUSTRIA.

**AUSTRIA, ARCHDUCHY OF.** The nucleus of the Austrian Empire. It lies on both sides of the Danube, from the mouth of the Inn to the borders of Hungary, and embraces the crownlands of Lower and Upper Austria and Salzburg (qq.v.).

**AUSTRIA, LOWER.** See LOWER AUSTRIA.

**AUSTRIA, UPPER.** See UPPER AUSTRIA.

**AUSTRIA-HUNGARY,** or, officially, THE AUSTRO-HUNGARIAN MONARCHY (Med. Lat. *Austria*, from Ger. *Oesterreich*, eastern realm + Hungary). The largest European country after Russia since the separation of Sweden and Norway. It forms a compact territory, lying between lat. 42° and 51° N. and between long. 9° 30′ and 26° 30′ E., and is bordered for a shorter distance by the sea than any other great European state. Its coast line comprises the greater part of the eastern shore of the Adriatic, the bulk of the country receding to a great distance from the sea. It is irregularly bounded on the north by Saxony, Prussia, and Russia; on the east by Russia and Rumania; on the south (including Bosnia and the Herzegovina) by Rumania, Servia, and Montenegro; on the southwest by the Adriatic Sea and Italy, and on the west by Switzerland and Bavaria. The former Turkish provinces of Bosnia and the Herzegovina were placed in 1878, by the Treaty of Berlin, under the administration and military occupation of the Austro-Hungarian government, and on Oct. 5, 1908, were formally annexed to the monarchy. Austria is sometimes called Cisleithania, "the country on this side the Leitha" (a tributary of the Danube forming part of the boundary between Lower Austria and Hungary), while Hungary is called Transleithania, "the country beyond the Leitha." The total area of the Austro-Hungarian monarchy is 261,241 square miles, distributed as follows: Crownlands represented in the Austrian Reichsrat (Parliament), 115,831.9 square miles; lands of the Hungarian crown, 125,641.2 square miles (of which Hungary proper 109,216.1 and Croatia and Slavonia 16,425.1); Bosnia and the Herzegovina, 19,767.9 square miles. The maximum length of the monarchy, from east to west, is about 800 miles; maximum breadth, from north to south, about 650 miles. The table above shows the area and the *de facto* population of Austria by crownlands, of Hungary by divisions, of Croatia and Slavonia, of Bosnia, and of the Herzegovina. The population figures are those returned by the censuses of Dec. 31, 1900, and Dec. 31, 1910; for Bosnia and the Herzegovina, however, the figures are those of the censuses of April 22, 1895, and Oct. 10, 1910, and hence the totals given for the monarchy cannot be quite exact. As Bosnia and the Herzegovina were not annexed until 1908, the population of the monarchy as constituted in 1900 was 45,405,267.

| Provinces | Square miles | Population 1900 | Population 1910 |
|---|---|---|---|
| Lower Austria | 7,654.4 | 3,100,493 | 3,531,814 |
| Upper Austria | 4,626.3 | 810,246 | 853,006 |
| Salzburg | 2,761.9 | 192,763 | 214,737 |
| Styria | 8,658.4 | 1,356,494 | 1,444,157 |
| Carinthia | 3,987.0 | 367,324 | 396,200 |
| Carniola | 3,841.7 | 508,150 | 525,995 |
| Triest | 36 8 | 178,599 | 229,510 |
| Gorz and Gradisca | 1,126.7 | 232,897 | 260,721 |
| Istria | 1,913.6 | 345,050 | 403,566 |
| Tirol | 10,301.7 | 852,712 | 946,613 |
| Vorarlberg | 1,004.6 | 129,237 | 145,408 |
| Bohemia | 20,056 6 | 6,318,697 | 6,769,548 |
| Moravia | 8,579.7 | 2,437,706 | 2,622,271 |
| Silesia | 1,987.3 | 680,422 | 756.949 |
| Galicia | 30,307.8 | 7,315,939 | 8,025,675 |
| Bukowina | 4,031.4 | 730,195 | 800,098 |
| Dalmatia | 4,954.0 | 593,784 | 645,666 |
| Austrian Empire | 115,831.9 | 26,150,708 | 28,571,934 |
| Right bank Danube | 17,201.9 | 2,923,401 | 3,084,404 |
| Left bank Danube | 12,713.9 | 2,049,611 | 2,175,924 |
| Between Danube and Theiss | 13,942.5 | 3,284,233 | 3,769.658 |
| Right bank Theiss | 12,289.2 | 1,674,241 | 1,769,681 |
| Left bank Theiss | 16,732.8 | 2,336,104 | 2,594,924 |
| Between Theiss and Maros | 14,009.6 | 2,054,712 | 2,141,769 |
| Transylvania | 22,318.1 | 2,476,998 | 2,678,367 |
| Fiume | 8.1 | 38,955 | 49,806 |
| Hungary | 109,216.1 | 16,838,255 | 18,264,533 |
| Croatia and Slavonia | 16,425.1 | 2,416,304 | 2,621,954 |
| Hungarian Kingdom | 125,641.2 | 19,254,559 | 20,886,487 |
| Austria-Hungary | 241,473.1 | 45,405,267 | 49,458,421 |
| Bosnia | 16,239.4 | 1,348,581 | 1,631,006 |
| Herzegovina | 3,528.5 | 219,511 | 267,038 |
| Civil population | ..... | 1,568,092 | 1,898,044 |
| Military | ..... | 22,944 | 33,758 |
| Bosnia and Herzegovina | 19,767.9 | *1,591,036 | †1,931,802 |
| Monarchy | 261,241.0 | 46,996,303 | 51,390,223 |

* Census of April 22, 1895. † Census of Oct. 10, 1910.

The population according to the language, or the principal language, spoken was returned as follows at the 1910 census, for the more important languages of Austria and Hungary:

| LANGUAGE | AUSTRIA | | HUNGARY | |
|---|---|---|---|---|
| | No. | P. ct. | No. | P. ct. |
| German | 9,950,266 | 35.58 | 1,903,357 | 10.40 |
| Magyar | 10,974 | .04 | 9,944,627 | 54.50 |
| Bohemian, Moravian and Slovak | 6,435,983 | 23.02 | ..... | ..... |
| Slovak | ..... | ..... | 1,946,357 | 10.70 |
| Polish | 4,967,984 | 17.77 | ..... | ..... |
| Ruthenian | 3,518,854 | 12.58 | 464,270 | 2.50 |
| Servian and Croatian | 783,334 | 2.80 | ..... | ..... |
| Servian | ..... | .... | 461,516 | 2.50 |
| Croatian | ..... | .... | 194,808 | 1.10 |
| Rumanian | 275,150 | 0.98 | 2,948,186 | 16.10 |
| Slovene | 1,252,940 | 4.48 | ..... | .... |
| Italian and Ladin | 768,422 | 2.75 | ..... | ..... |
| Others * | 608,062 | .... | 401,412 | 2.2 |
| | 28,571,934 | | 18,264,533 | |

* Including, in Austria, foreigners, of whom about 300,000 are Magyars.

The figures for Hungary in the foregoing table do not include those of Croatia and Slavonia, which are as follows: Croatian, 1,638,354 (62.5 per cent); Servian, 644,955 (24.6); German, 134,078 (5.1); Magyar, 105,948 (4.1); Slovak, 21,613 (0.8); Ruthenian, 8317 (0.3); Rumanian, 846; other, 67,843 (2.6). For the monarchy (including Bosnia and the Herzegovina) population by language was as follows in 1910: German, 12,010,669; Magyar, 10,067,992; Bohemian, Moravian, Slovak, 8,410,998; Polish, 4,978,959; Ruthenian, 3,998,872; Servian and Croatian, 5,545,531; Rumanian, 3,224,147; Slovene, 1,252,940; Italian and Ladin, 768,422; others (including foreigners in Austria and the military in Bosnia and the Herzegovina), 1,131,693; total, 51,390,223.

**Topography.** Austria-Hungary is the most mountainous part of Europe excepting Switz-


AUSTRIA, HUNGARY, CZECHO-SLOVAKIA, ROUMANIA, AND YUGO-SLAVIA
SCALE OF STATUTE MILES
0 20 40 60 80 100 120
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160 180 200
Important towns are shown In heavy face type
Railways
Canals
VIENNA AND VICINITY
SCALE OF MILES
0 1 2
Longitude 18° East from Greenwich
L. L. POATES, ENGR'G CO., N.Y.

erland. Four-fifths of Austria is 600 feet above the sea. The mountains are comprised in three great systems—the Eastern Alps, the Carpathians, and the Bohemian Highlands. The Alps cover the crownlands of Tyrol, Salzburg, Carinthia, Carniola, Styria, and the parts of Upper and Lower Austria south of the Danube. The mountains, though lower than the Swiss Alps, often rise above the snow line. The eastern spurs of the Alps stretch through Croatia towards the southwestern part of Hungary. The total area of the Austro-Hungarian Alps is estimated at about 40,000 square miles, of which nearly 700 square miles are covered with glaciers. Their highest peaks are in the Rhætian and Noric Alps, which extend from Switzerland to the Danube. The Ortler Spitze, the loftiest summit in Austria-Hungary, rises to a height of nearly 12,800 feet. The Carpathian Mountains, greatly inferior to the Alps in height, describe an immense curve, amounting to two-thirds of a circle, about Hungary, girding it on the north and east, and covering an extensive area in Transylvania. In their broad sweep of above 800 miles, from the Danube at Pressburg back to that river at the Iron Gates, they embrace the vast Hungarian plain, a region more level than the prairies of the United States. The highest peak of the Carpathians is the Gerlsdorfer Spitze, about 8700 feet. Finally, the mountains that edge the western, northern, and eastern edges of Bohemia and Moravia are the connecting link between the mountain systems of Austria-Hungary and the Mittelgebirge or hilly regions of central Europe. At the head of the Adriatic is the remarkable highland region, of limestone formation, known as the Karst. On the borders of Dalmatia and Bosnia is a mountain range which bears the name of the Dinaric Alps. The mountains of Austria-Hungary are famous for their picturesque scenery and abound in caverns, some of them very large. In the Alpine provinces the finest glacier scenery is around Gross Glockner in Carinthia; the finest rock scenery is in the Dolomites. The Adriatic coast land, with its many islands, its bays, and frowning heights, is one of the most picturesque regions in Europe.

**Hydrography.** Among the rivers of Austria-Hungary, the Danube is the most important, and is second only to the Volga in all Europe, its basin embracing about three-fourths of the total area of the country. It enters Upper Austria at Passau and, crossing Lower Austria in an easterly direction, enters Hungary, which it traverses eastward and beyond the Bakony Forest, then turns abruptly and flows due south to the border of Croatia, where it receives the Drave, then flows again eastward, receives from the north its principal affluent, the Theiss, and from the west the Save, and at the Iron Gates breaks through the southern extremity of the Carpathian range, to descend thence into the great plains of Rumania and Bulgaria. The Danube is a very important factor in the economic life of the country, affording the largest navigable waterway. Besides the Danube there are several large rivers in Austria-Hungary. The Theiss, with its largest tributary, the Maros, collects all the waters of eastern Hungary and delivers them to the Danube at Titel. Two other great tributaries of the Danube, the Drave and Save, collect the drainage of Croatia, Slavonia, Bosnia, Carniola, Carinthia, and a great part of Styria, since the high mountains bordering the Adriatic coast prevent any streams from the interior reaching that sea. The Elbe drains most of Bohemia, while the Dniester traverses eastern Galicia, and the Vistula forms part of the boundary line between Russian Poland and Galicia. The Inn traverses northern Tyrol, and the Adige, the principal river of Austria emptying into the Adriatic, flows through the southern part of that province. The Danube rises in Germany, but the Dniester, the Vistula, the Oder, and the Elbe, whose chief régime is in Germany or Russia, have their sources in Austria-Hungary. The lakes are comparatively few and insignificant. The most important are the Plattensee and the Neusiedlersee, in the western part of Hungary. There are numerous small lakes, especially in the Alps, some of them situated at an altitude of over 7000 feet and famous for their scenery. The uneven surface of Austria-Hungary is not favorable for the construction of artificial waterways, and the canals of the country are few and comparatively unimportant. The Franzens Canal is the longest (137 miles) and connects the Danube with the Theiss. Austria-Hungary is famous for its hot and mineral springs, of which there are over 2800, mostly situated in Bohemia, Hungary, and Transylvania. The most important of them are Karlsbad, Marienbad, and Teplitz (Bohemia). Austria surpasses all other European countries in the number and value of its mineral springs.

**Climate.** The climate of Austria-Hungary, while generally mild, differs considerably in different localities. The average annual temperature varies from 62° F. in Ragusa, in the southern part of Dalmatia, to 51° in Budapest and 48° at Prague. The northern Carpathians are characterized by very cold winters and cool summers, while in the valleys of Transylvania the winters are very severe and the summers very hot. The mean annual temperature of Vienna is about 50° F. The rainfall is very abundant and at times excessive, in the western part of the country, near the Alps, where in some places the total annual rainfall exceeds 100 inches; it is lowest in Lower Austria, Moravia, and Silesia, averaging about 25 inches per year. The western part of the country receives much more rain than the eastern.

**Fauna.** The geographical position of Austria as a part of southern central Europe gives it the fauna characteristic of its latitude, and there is little that is locally characteristic or different from that of the neighboring countries. The valley of the Danube forms one of the recognized migration highways for birds, between northeastern Europe and southern Asia; and the river abounds in fish that ascend from the Black Sea, furnishing important fisheries, of which that for sturgeon is notable. The valley regions have been largely denuded of wild animals by the civilization that has occupied them for so many centuries; but in the high Alps the chamois and ibex still survive in considerable numbers under legal protection; and the other high mountains still shelter bears, lynxes, wolves, and representatives of most of the species of smaller animals which originally dwelt there.

**Flora.** The flora of Austria-Hungary is characterized by great diversity and richness. It may be divided into vertical zones regulated by relative altitude on the mountains, from the fig and grape producing southern valleys to the Alpine summits. In the west the general flora is much like that of southern Germany, but on

the lower Danube and near the Adriatic trees and plants of a warmer climate prevail.

**Geology.** In its geographical structure Austria-Hungary shows as much variety as in the formation of its surface. Archæan rocks are represented by gneiss, schist, and granite in the Alps, Bohemian Highlands, and Carpathians and are noteworthy for their mineral riches. The Silurian formation underlies a large area in central Bohemia, where are located the celebrated silver mines of Pribram, and is also prominent in the Alps and in Galicia. The Devonian formation occurs in Moravia, Galicia, and the Alps. Carboniferous strata, frequently inclosing coal-beds, are found in central and western Bohemia, in Moravia, Silesia, Galicia, Styria, and Hungary (Eibenthal). Rocks of later age are represented by Triassic, Jurassic, Cretaceous, Tertiary, and alluvial beds, as well as by igneous intrusions. The Tertiary strata are of great economic importance, as they inclose valuable deposits of lignite and salt and also are intersected by igneous dikes that carry the gold and silver ores of Schemnitz, Kremnitz, and Nagy-Bánya. The vast plain of Hungary is covered by Tertiary and Quaternary deposits deeply mantled by loess and alluvium, which give to this granary of the empire its great fertility.

**Mining.** The mining industry of the monarchy dates centuries back, and some of the mines were worked by the Romans. The mineral deposits are remarkably rich and varied, including many metals, besides precious stones, mineral oil, and useful earths. Gold is found mainly in Hungary, while silver occurs in Hungary and Bohemia, and quicksilver in Carniola. Iron is the most important metallic product of the monarchy, and is worked in Styria, Bohemia, and various parts of Hungary. Copper is found in Salzburg and Hungary; lead is worked especially in Carinthia and somewhat in Galicia and Hungary. The most important and the most common mineral of Austria-Hungary is coal (including lignite). While coal is worked in all the Austrian crownlands except Salzburg and Bukowina, the greater part of the output comes from Bohemia, which produces more than one-half of the mineral products of Austria and nearly one-third of its metal products. Rock salt exists in immense beds on both sides of the Carpathians, in the county of Máramaros in Hungary, in Transylvania, and in Galicia. The salt mines of Wieliczka in Galicia are the most famous in the world. Salt is also made by state salt works by evaporating the water of salt springs, and from the sea water on the coast of the Adriatic. The sale of salt in Austria is a government monopoly. Of other salts, alum, sulphate of iron, and sulphate of copper are the most important. The useful earths include all sorts of clay up to the finest porcelain earth (in Moravia, Bohemia, and Hungary). Of precious and semi-precious stones the most abundant are the Hungarian opal (which passes in commerce as Oriental), Bohemian garnet (the finest in Europe), carnelian, agate, beryl, amethyst, jasper, ruby, sapphire, topaz, etc. In 1885 oil wells of great productiveness were opened at Kolomea, in Galicia, and heavy import duties were soon laid on foreign petroleum. Considerable deposits of zinc, tin, manganese, bismuth, sulphur, arsenic, uranium, nickel, and graphite are also found in the various parts of the monarchy.

The following table shows the amount in metric quintals and the value in thousands of kronen of the principal mining products in Austria in 1905 and 1909:

| Products | 1905 | | 1909 | |
|---|---|---|---|---|
| | Quintals | 1000 kr. | Quintals | 1000 kr. |
| Coal | 125,852,628 | 99,875 | 137,130,425 | 141,348 |
| Lignite | 226,920,760 | 100,957 | 260,437,157 | 138,685 |
| Iron ore | 19,137,819 | 16,814 | 24,902,769 | 22,730 |
| Lead ore | 233,383 | 4,216 | 205,501 | 3,499 |
| Silver ore | 210,474 | 3,010 | 211,017 | 3,386 |
| Mercury | 868,562 | 2,240 | 923,373 | 2,161 |
| Zinc ore | 299,828 | 2,410 | 339,548 | 1,988 |
| Graphite | 344,160 | 1,351 | 407,104 | 1,581 |
| Copper ore | 106,772 | 565 | 118,258 | 819 |
| Gold ore | 359,369 | 758 | 297,090 | 594 |

The total value of the mining products of Austria, as reported for 1905, were 233,145,531 kronen; 1907, 295,486,865; 1909, 317,490,564; 1911, 363,054,000. These figures do not include the value of the salt and petroleum output. Salt production in 1905 amounted to 3,433,747 quintals, valued at 45,579,033 kronen; in 1909, 3,598,006 quintals, valued at 46,740,565 kronen. Petroleum production is limited to Galicia. In 1901 the output was 4,046,000 quintals, valued at 23,010,000 kronen, and 27,072 quintals of ozocerite, valued at 2,572,000 kronen. The combined output in 1905 was 7,973,484 quintals, worth 23,718,999 kronen; in 1909, 20,884,569 quintals, worth 34,928,285 kronen (of which, petroleum 20,863,415 quintals, 32,221,494 kronen).

The more important furnace products in Austria were as follows in amount and value in 1905 and 1909:

| Products | 1905 | | 1909 | |
|---|---|---|---|---|
| | Quintals | 1000 kr. | Quintals | 1000 kr. |
| Pig iron | 11,196,136 | 83,227 | 14,650,508 | 117,084 |
| Zinc | 93,261 | 5,283 | 116,877 | 5,942 |
| Lead | 129,680 | 4,810 | 129,412 | 4,676 |
| Silver (grammes) | 38,453,492 | 3,754 | 39,002,175 | 3,256 |
| Mercury | 5,198 | 2,551 | 5,848 | 3,170 |
| Copper | 8,701 | 1,508 | 9,848 | 1,442 |
| Gold (grammes) | 204,292 | 656 | 148,439 | 482 |

The total value of the furnace products of Austria, as reported for 1905, was 103,205,734 kronen; 1907, 132,807,655; 1909, 137,235,740; 1911, 156,559,000. There were employed in the mines of Austria in 1909 150,209 persons; in the salt works, 6617; in smelting, 8941; in the petroleum and ozocerite industry, 6446.

In Hungary the more important mining and furnace products included in 1911 lignite valued at 77,200,000 kronen; pig iron, 43,848,000; coal, 15,481,000; iron ore, 13,334,000; gold, 10.469,000; and silver, 907,000. In 1908 the lignite output was 70,344,993 quintals, valued at 61,546,000 kronen; in 1910, 75,788,460 quintals, 69,828,000 kronen. Coal, 9,820,169 and 10,851,320 quintals, 12,794,000 and 13,877,000 kronen; pig iron, 5,229,739 and 5,020,558 quintals, 43,556,000 and 40,987,000 kronen. The gold output was valued at 10,787,000 kronen in 1908 and 9,960,000 kronen in 1910. The total value of mining and furnace products rose from 70,948,982 kronen in 1893 to 106,743,742 kronen in 1900, 106,173,334 in 1905, and 152,837,807 in 1910. In addition is the salt output, which in 1908 amounted to 2,475,326 quintals, worth 33,-

924,000 kronen, and in 1910 2,462,056 quintals, 33,950,000 kronen. In 1911 79,336 persons were employed in mining and smelting in Hungary, and 2622 in the salt works.

**Agriculture.** Rich soil, abundance of water, and a mild climate have combined to make Austria-Hungary one of the foremost agricultural countries in Europe. Its crops are remarkable for their variety, embracing, besides all the common European products, a great many subtropical plants and fruits. The most fertile lands are those in Hungary, Bohemia, Moravia, Lower and Upper Austria, and Galicia.

The distribution of land is stated as follows for 1910, in hectares (1 ha. = 2.471 acres):

| DISTRIBUTION OF LAND | AUSTRIA | | HUNGARY | |
|---|---|---|---|---|
| | Ha. | P. ct. | Ha. | P. ct. |
| Arable land ..... | 10,641,996 | 35 37 | 13,916,061 | 42.82 |
| Gardens ..... | 377,965 | 1.26 | 427,492 | 1.32 |
| Vineyards..... | 223,077 | 0 74 | 309,813 | 0.95 |
| Meadows, pastures, etc..... | 7,171,779 | 23.90 | 3,191,686<br>3,977,022 | 9 82<br>12 24 |
| Woodland ..... | 9,788,080 | 32.63 | 8,096,505 | 27.41 |
| Lakes, marsh, etc. | 105,024 | 0.35 | 66,254 | 0.20 |
| Unproductive (untaxed)..... | 1,692,872 | 5 63 | 1,701,604 | 5.24 |
| | 30,000,793 | 100.00 | 32,496,437 | 100.00 |

With the great variety in climatic and topographical conditions of the monarchy, ranging from the sunny slopes of the Adriatic coast land to the snow-clad Alps, and from the vine-clad hills of the Tirol in the west, to the broad, fertile plains of Hungary in the east, the agricultural products of Austria-Hungary offer as great contrasts as can be found between those of any two countries of Europe.

The first half of the table below gives the area (in hectares; 1 hectare = 2.471 acres) sown to main crops, and the second gives the yield (in quintals of 220.46 lbs.) for 1910 and 1912:

| PRODUCTS | AUSTRIA | | HUNGARY | |
|---|---|---|---|---|
| | 1910 | 1912 | 1910 | 1912 |
| Wheat ... | 1,213,579 | 1,260,317 | 3,793,999 | 3,877,309 |
| Rye ... | 2,060,980 | 2,032,138 | 1,137,576 | 1,240,339 |
| Barley ... | 1,101,525 | 1,065,903 | 1,163,090 | 1,116,740 |
| Oats..... | 1,833,018 | 1,866,931 | 1,165,995 | 1,097,563 |
| Corn ... | 311,773 | 304,184 | 2,830,398 | 2,437,217 |
| S. Beets . | 253,731 | 264,456 | 117,760 | 175,885 |
| Wheat ... | 15,673,315 | 18,952,639 | 49,297,262 | 50,251,406 |
| Rye ... | 27,671,921 | 29,748,033 | 13,155,227 | 14,411,799 |
| Barley ... | 14,722,147 | 17,065,756 | 12,134,360 | 15,701,907 |
| Oats ... | 20,631,564 | 24,300,998 | 10,845,119 | 11,656,408 |
| Corn..... | 4,416,782 | 3,885,058 | 54,229,398 | 44,882,694 |
| S. Beets... | 70,618,000 | 79,237,695 | 29,222,365 | 48,366,413 |

Sown to flax in 1912: 36,739 hectares in Austria, with a yield of 233,752 quintals fibre and 165,235 quintals seed; under vineyards: 224,293 hectares, yielding 3,969,873 hectoliters of wine. Tobacco: 3422 hectares and 56,651 quintals in Austria; 48,527 hectares in Hungary. In Austria (1912) 10,245 hectograms of silkworm eggs placed for hatching yielded 2,185,470 kilograms of cocoons; in Hungary proper, 10,790 hectograms of eggs, 1,151,120 kilograms of cocoons.

The eastern half, or Hungary, serves as the granary of the monarchy, besides exporting considerable quantities of grain to southern Germany and Switzerland. The western half, or Austria, produces everything from wheat to subtropical fruits, but it depends on Hungary for much of its grain supply. Among its chief products are industrial plants, such as sugar beets, hops, potatoes, etc. The varied nature of the two parts of the monarchy may be seen from the foregoing table.

Thus it will be seen that Austria furnishes a little more than one-fourth of the total wheat crop of the country, less than one-tenth of the corn, and less than one-tenth of the tobacco crop. If, in addition to this, it is remembered that even these small figures include the crops of Galicia, which geographically belongs to the eastern half of the monarchy, and whose products of wheat, corn, and tobacco constitute one-third, one-fourth, and two-thirds of the total respective crops of Austria, the latter's share in those crops will be seen to be very small indeed. On the other hand, Austria furnishes nearly three-fourths of the rye crop of the monarchy and about two-thirds of the potato crop, both of which are largely used in the distilleries. Vine growing has shown a decline in Hungary, but the monarchy still holds an important place among wine-producing countries. Horticulture is carried to great perfection, and the orchards of Bohemia, Austria proper, Tirol, and many parts of Hungary produce a profusion of fruits. The chief orchard products of the monarchy, in the order of their commercial importance next to grapes, are plums, peaches, apricots, apples, nuts, almonds, chestnuts, and figs, considerable quantities of which are exported annually. In Tirol, Dalmatia, and southern Hungary olive and mulberry trees are successfully raised and are gaining in area of cultivation. Potatoes are raised everywhere, and in elevated districts are often almost the sole subsistence of the inhabitants. Great quantities of cider are made in Upper Austria and Carinthia and of plum brandy in Slavonia. In Dalmatia oranges and lemons are raised; much more olive oil is imported than is produced in the country.

Stock breeding is largely developed in the Alpine highlands and in the Hungarian plains, in both of which pastures are abundant and the land is best adapted for grazing purposes. In Austria, however, not enough cattle are raised to satisfy the home demand. Sheep breeding in Austria has suffered a great decline from the competition of Australian wool. The breeding of sheep, like that of horses, has been a special object of care to the government. The finer wools are produced, but the greater part of the clip is not of superior grade. The pride of Austro-Hungarian stock breeders is their horses, which are among the finest in Europe, and whose number in the monarchy is second only to that in Russia and Germany. Horse breeding is promoted by "military studs." Besides a number of imperial studs, there are a great many private ones, especially in Hungary.

Live stock in Austria (1910), Hungary (1911), and Bosnia and the Herzegovina (1910): horses, 1,802,848, 2,350,647, and 221,981; cattle, 9,160,009, 7,318,088, and 1,309,922; sheep, 2,428,101, 8,547,042, and 2,499,422; swine, 6,432,080, 7,578,690, and 527,271; goats, 1,256,778, 426,975, and 1,393,068.

Forestry is one of the most important industries in Austria-Hungary. Of the total area of forest in Austria more than two-thirds is under

pines and other trees found in high altitudes, while in Hungary beech and oak predominate, though pines also are abundant. The forests are chiefly situated in the Carpathians, Alps, and other mountains. The administration of the forests and domains belonging to the state is under control of the ministry of agriculture, and includes schools of forestry; and the exploitation of the forests is subject to restrictive regulations. The average annual yield of the forests exceeds 1,050,000,000 cubic feet of timber. over 40 per cent of which is used for manufacturing and building purposes, and less than 60 per cent as fuel. The extensive forests, besides timber, yield a number of secondary products, as tar, potash, charcoal, bark, cork, etc.

The land distribution in Austria-Hungary differs in its several parts. In Galicia, Bukowina, and to a considerable extent in Hungary, where the cultivation of wheat and cattle and sheep raising constitute the chief branches of agriculture, large estates thrive best and occupy from 25 to 46 per cent of the total area under farms. Nearly 87 per cent of the peasants, however, own their farms. But these are often not large enough to yield a living, and their owners depend on employment as day laborers on neighboring large estates. On the other hand, in Dalmatia and southern Tirol, where fruit raising, wine making, and silk culture constitute the chief occupation, small farms are most successful and the peasants are prosperous, owning from 92 to 97 per cent of the land. In the remaining crownlands peasant holdings occupy about three-fourths of the total agricultural area.

**Manufactures.** The industrial development of Austria-Hungary has advanced rapidly in recent years, and in many cases this has been due to the material support received from the government in direct subventions, reduced freight rates on state railways, and exemption from import duties on certain raw products and machinery. The following are the 11 most important industries in the country, employing more than 100,000 persons each: 1. The clothing industry, with nearly 700,000 workers—less than three-sevenths of whom are employed in Hungary, and the rest in Austria. 2. Manufacture of foods and drinks, nearly 500,000 persons, three-tenths of them in Hungary. 3. The textile industry, nearly 400,000 persons, less than one-tenth employed in Hungary. 4. Building trades, nearly 435,000, over one-fourth of whom are employed in Hungary. 5. Wood working, about 300,000, less than a third of them in Hungary. 6. The iron and steel works furnish employment to 375,000 persons, over one-third of whom are in Hungary. 7. The quarries and potteries keep some 260,000 persons busy, less than one-fifth of them in Hungary. 8. Machine building and tool and implement making give employment to over 200,000, one-third of them in Hungary. 9–11. Finally, the paper, leather, and chemical industries each gives work to between 60,000 and 70,000; less than one-fourth of these are employed in Hungary.

The mere enumeration of the principal industries of Austria-Hungary shows the overwhelming industrial importance of Austria in the monarchy. It is this industrial diversity of Austria and Hungary that makes the monarchy more or less self-sufficient, the two halves depending upon exchange with each other for their material well-being. The chief seats of industry in Austria are Bohemia, Silesia, Moravia, and Lower Austria. In Hungary Budapest is the heart of industrial activity, 40 per cent of the factory population being employed there; yet the number of Budapest's manufacturing establishments is but 10 per cent of the total, which shows that most of the large modern factories and mills of Hungary are located in its capital.

The most important industries conducted on a large scale, and playing a leading part in commercial and financial life, are the textile and iron and steel industries. The maintenance of the textile industries has always been an object of special solicitude with the people of Austria, because it not only furnishes employment, but also affords a market for the wool and flax crops of the country. But although the wool and linen industries are still flourishing, their relative importance is receding before the rapidly growing cotton industry. The raw cotton is imported from the United States and India, and is converted into finished products in the spinning, weaving, bleaching, dyeing, and printing establishments of the monarchy. In 1831 the imports of raw cotton amounted to 12,456,000 pounds; in 1858 they rose to 87,523,000 pounds. Cotton was seriously threatening the very existence of the linen industry, when the breaking out of the Civil War in the United States, with the consequent cotton famine, gave the linen industry a chance to revive. After the war the cotton industry took a new lead, and the imports of cotton jumped to 132,739,000 pounds in 1871, 245,482,200 pounds in 1891, 358,269,500 pounds in 1898, and 479,280,040 pounds in 1907; in 1910, the import was 410,716,980 pounds. The silk industry has also advanced rapidly, owing chiefly to the increased cultivation of the silkworm in Hungary. Formerly the seat of silk manufacture was largely centred in southern Tirol and the neighboring region; now there are large silk-spinning establishments in Szekszárd, Pancsova, and Ujvidék (Neusatz), in Hungary, in which country 107,637 families were engaged in the production of raw silk in 1903, as against only 1059 families in 1879. All of the textile products enumerated constitute an important item of export from Austria-Hungary.

The iron and steel industry is abreast of the times in its methods of manufacture. The production of pig, cast, and wrought iron, Bessemer steel, iron bars, etc., although large, is barely sufficient to cover the home demand on the part of the manufacturers of steel rails, iron plate, steel wire, etc., besides the numerous comparatively smaller manufactures of all kinds of metallic ware. In addition there is the very important machine-building industry, which includes the manufacture of locomotives, agricultural machinery, and all kinds of machinery used in modern manufacturing establishments. Many of these products, however, are produced in quantities inadequate to meet the domestic demand.

The milling industry is still carried on to a considerable extent by small establishments, in which the motive power is wind or water, but there are now thousands of steam mills, most of them in Hungary. Some of them, as those in Budapest, are on a large scale.

In 1890 there were 106,616 distilleries, the great mass being diminutive stills, of which 27,055 were in Austria, and 79,561 in Hungary. In 1898, out of 30,637 distilleries in Austria, only 600 used any kind of machinery, and a simi-

lar proportion held in Hungary. But of the 25,434,000 gallons produced by the 79,010 distilleries in Hungary in 1896, 24,884,000 gallons, or 97.8 per cent of the total product, were turned out by 501 distilleries, or about one-half of 1 per cent of all the distilleries. In 1910 there were 45,384 distilleries in Austria and 62,411 in Hungary. The combined annual production of alcohol is about 60,000,000 gallons. The number of breweries is on the decrease, because the small breweries are crowded out of existence by their new large rivals. In 1865 there were 3143 breweries; in 1880 there were 2217; in 1890, 1859 (1761 in Austria and 98 in Hungary); in 1903, 1513 (1423 and 90); in 1911, 1266 (1183 and 83). The annual output of the Austro-Hungarian breweries is over 550,000,000 gallons and is exceeded only by those of Germany and Great Britain in all Europe.

The beet-sugar industry is one of considerable importance in Austria, as well as in Hungary, and is fostered by the government by a very liberal bounty system. In 1865 there were 147 refineries in the monarchy; the number grew to 215 (198 in Austria and 17 in Hungary) in 1890, and 234 (214 in Austria and 20 in Hungary) in 1898, and the annual output increased from 845,000 tons of sugar in 1890 to nearly 935,000 tons in 1898, which not only covered the entire domestic demand, but also furnished a considerable surplus for export. In 1909 the output in Austria was 1,003,731 tons; in 1910 in Hungary, 333,343 tons. About three-fifths of the Austrian sugar is produced in Bohemia. The sugar industry gives employment to over 90,000 people, of whom about one-fifth are employed in Hungary.

The glass industry is especially developed in Bohemia, whose products are famous and constitute a very important article of export. The pottery products are also of importance and include the most artistic and expensive porcelain and china ware. The chemical industry thrives especially in Bohemia, Silesia, Lower Austria, and Hungary. and its most important products are potash, sulphuric and hydrochloric acids, pharmaceutical goods, and dyestuffs and explosives. The manufacture of paper, carried on extensively, furnishes large quantities for export, giving employment to some 60,000 people. The manufacture of friction matches is carried on extensively in Austria.

The leather industry sprang up at an early date, as a natural outgrowth of the country's enormous stock raising, and has developed to such an extent as to require the importation of considerable quantities of hides from abroad; and yet it is unable to supply the domestic demand for leather, which also has to be imported in great quantities.

The manufacture of tobacco has constituted a government monopoly since 1670. It is carried on in 51 factories, of which 30 are in Austria and 21 in Hungary, giving employment to over 60,000 persons, more than 90 per cent of whom are women. The annual output of the government factories aggregates about 1,875,000,000 cigars, 8,400,000,000 cigarettes, over 435,000 quintals of smoking tobacco, and between 12,000 and 13,000 quintals of snuff. The estimated gross revenue from the tobacco monopoly, according to the budgets for 1912, was 318,258,100 kronen for Austria and 185,267,000 kronen for Hungary.

**Transportation.** *Railways.*—The first steam railway in Austria, the Kaiser Ferdinand Nordbahn, 8 miles long, was opened in November, 1837; a horse railway—the first ever built in Europe—had existed since 1825. The first steam line was built by a private company, and it was not till 1841 that the government began to construct railways on its own account. In the meantime the great prosperity of the country in the early forties, with its consequent abundance of idle capital seeking investment, stimulated the construction of many private lines and sent up the price of railway shares on the exchanges. The poor crops of 1845, however, and the commercial panic of 1846 which followed, brought ruin to many and left the railways in a pitiful plight. It was in these circumstances that the government determined upon the policy of nationalizing the railways and appropriated over $10,000,000—soon increased to $25,000,000—for buying up the shares of private railway companies; and in less than a year (September, 1847) the government owned a controlling interest in four of the largest railways of the country—the Hungarian, the Lombardo-Venetian, the Gloggnitz, and the Oedenburg railways. The financial straits in which these railways found themselves forced the government to pursue to an end the policy it had once begun and buy out the roads entirely. By September, 1854, the government was in possession of 1100 miles of railways, or practically the entire mileage of Austria. In the following year, however, it suddenly reversed its policy and began to dispose of its acquired lines, and by 1858 the total length of the state lines dwindled down to some 8 miles. This radical change in railway policy, while partly due to official mismanagement under state control, was mainly caused by the government's need of a large amount of ready cash, in order to effect a change in its monetary standard. The following decade was marked by feverish activity in construction, due largely to indiscriminate grants of subventions by the government to private companies. From 1860 to 1870 the length of private lines increased from 1815 miles to 3800 miles, while the proportion of subsidized roads increased from 20 per cent at the close of the fifties to 75 per cent in 1866. In 1873 the Austrian government, partly influenced by the great drain upon its finances caused by the granting of subventions, and partly stimulated by the success of state railway ownership in Germany and in France, made an attempt to return to its former policy. As an initial step in that direction, a law was passed in 1877 conferring on the government the right to take over, with a few exceptions, all the lines which had been receiving a subvention from it or whose payment of interest had been guaranteed by it. The total amount paid out by the government in the form of subventions and guarantees up to 1876 was about $49,000,000. Since 1877 the state has steadily increased its railways, both by construction and by purchase, so that at the beginning of 1905 it owned and controlled over 56 per cent of the total railway mileage, which amounted to 13,425.

The experience of Hungary with its railways has been, in the main, the same as that of Austria, with the difference that the Hungarian government, since the *Ausgleich* of 1867, has pursued the policy of state ownership and control with greater energy. The first steam railway was opened in July, 1846, a line 21 miles

long, from Budapest to Vâes (Waitzen). At the beginning of 1905 the total length of railway lines was about 12,533 miles, of which nearly 73 per cent was owned or controlled by the government. The following table

| YEAR | AUSTRIA | | HUNGARY | |
|---|---|---|---|---|
| | State (miles) | Private (miles) | State (miles) | Private (miles) |
| 1850 ..... | 516 | 325 | 120 | 17 |
| 1860..... | 8 | 1817 | | 1002 |
| 1870..... | 8 | 3781 | 221 | 1935 |
| 1880..... | 1221 | 5867 | | |
| 1890.. ... | 4129 | 5359 | 3533 | 3440* |
| 1904..... | 7614 | 5130 | 9149† | 1849† |

* Including 2000 miles operated by the state.
† 1903.

illustrates the growth of railway lines in Austria and Hungary. At the beginning of 1911 the mileage in Austria was 14,335; in Hungary, 13,087; in Bosnia and the Herzegovina, 1215; total, 28,638.

**Merchant Marine and Shipping.** Cut off from the sea on all sides except for a small outlet on the Adriatic, Austria-Hungary naturally falls behind all of the leading European countries in her merchant marine. In 1903 this comprised 16,229 vessels of 437,830 tons in Austria, and 466 vessels of 134,229 tons in Hungary. Of these, Austria had 382 steamers of 390,487 tons, and Hungary 128 steamers of 132,483 tons. Austria employed altogether 43,858 seamen, and Hungary 2905. In 1884 the merchant marine of the entire monarchy consisted of 9206 vessels of 324,458 tons, employing 29,358 people. In 1910 190,105 vessels of 28,235,486 tons entered and 189,986 of 28,335,345 tons cleared at Austro-Hungarian ports; as against 85,000 vessels of 11,000,000 tons in 1891. About 90 per cent of these vessels carried the Austro-Hungarian flag, next in the order of importance being those of Italy, Greece, and Great Britain. The most important seaports are Triest in Austria and Fiume in the Kingdom of Hungary. The Danube is navigated by a large number of steamboats throughout the whole of its course in Austria-Hungary, and affords a great outlet to the Black Sea.

**Commerce.** The lofty mountains surrounding the country on nearly all sides and the small extent of its coast line are great obstacles in the way of development of foreign commerce. On the other hand, the great diversity of natural resources in the monarchy is especially favorable to an active internal trade. For purposes of commerce, Austria and Hungary form a single customs union, maintained by mutual agreement. According to it the commercial relations of the two halves of the monarchy to each other and to foreign countries are exactly the same as in the case of the separate States of the United States; no import or export duties can be levied on goods going from one part of the monarchy to the other, and all duties on foreign goods are uniform throughout the country. Nearly 1,000,000 people are employed in commerce. Eighty-five per cent of the entire foreign commerce is by land.

The following tables show the development of foreign commerce from 1895 to 1910. Imports of merchandise for home consumption, of total merchandise, of coin and bullion, and total imports, in thousands of kronen:

| Year | Mdse. home consumption | Total mdse. | Coin and bullion | Total imports |
|---|---|---|---|---|
| 1895. .. | 1,444,986 | 1,487,052 | 107,659 | 1,594,711 |
| 1900 ... | 1,696,358 | 1,748,968 | 44,898 | 1,793,866 |
| 1905. .. | 2,146,133 | 2,213,145 | 55,982 | 2,269,127 |
| 1910.... | 2,852,852 | 2,929,734 | 43,099 | 2,972,833 |

Exports of domestic merchandise, of total merchandise, of coin and bullion, and total exports, in thousands of kronen:

| Year | Domestic merchandise | Total mdse. | Coin and bullion | Total exports |
|---|---|---|---|---|
| 1895.... | 1,483,620 | 1,568,118 | 50,362 | 1,618,480 |
| 1900.... | 1,942,003 | 2,061,705 | 66,546 | 2,128,251 |
| 1905. .. | 2,243,780 | 2,390,722 | 59,533 | 2,450,255 |
| 1910... | 2,418,606 | 2,587,641 | 80,931 | 2,618,572 |

In 1909 and 1910 imports of raw materials, in millions of kronen, amounted to 1604.4 and 1582.3; partially manufactured materials. 435.0 and 476.0; manufactures, 706.9 and 794.6; exports of raw materials. 875.5 and 870.3; partially manufactured, 406.0 and 434.9; manufactures, 1037.4 and 1113.4. In 1911 imports and exports, in the special trade, were valued at 3,191,712,000 and 2,404,304,000 kronen respectively. In that year the larger classes of imports were as follows, in millions of kronen: Cotton, 313.7; coal, 189.0; seeds, 151.6; wool, 146.4; machinery and implements, 119.0; common metals, 119.0; hides (raw), 108.7; coffee, 92.6; cereals, 88.1; iron and iron manufactures, 83.9; leather, 73.0; silk and silk thread, 62.2; silk manufactures, 60.1; jewelry, 59.4; eggs, 57.5; cotton goods, 56.2. The larger classes of exports were: wood, 270.6; sugar, 216.6; cotton goods, 123.5; eggs, 112.6; apparel, etc., 97.8; coal, 94.9; wooden manufactures, 81.4; machinery, 78.2; iron and iron manufactures, 72.5; hides (raw), 72.5; woolen goods, 71.5; glass and glassware, 71.2; metal articles, 60.5; paper and paper manufactures, 60.1.

Special trade in merchandise by countries, in thousands of kronen:

| COUNTRY | IMPORTS | | EXPORTS | |
|---|---|---|---|---|
| | 1910 | 1911 | 1910 | 1911 |
| Germany..... | 1,153,882 | 1,263,204 | 1,062,483 | 1,038,217 |
| United States... | 236,920 | 289,760 | 81,352 | 58,452 |
| United Kingdom. | 228,534 | 229,448 | 224,433 | 216,279 |
| British India.... | 214,038 | 219,739 | 68,624 | 51,574 |
| Russia..... | 167,212 | 209,215 | 90,999 | 96,100 |
| Italy. ..... | 131,022 | 141,629 | 229,390 | 222,133 |
| France. ..... | 112,376 | 112,417 | 76,166 | 74,955 |
| Switzerland..... | 84,732 | 85,366 | 104,852 | 112,096 |
| Rumania..... | 52,163 | 78,150 | 102,929 | 123,974 |
| Brazil..... | 59,203 | 75,376 | 10,762 | 11,693 |
| Total, including other ... | 2,852,852 | 3,191,712 | 2,418,606 | 2,404,304 |

Commerce between Austria-Hungary and the United States has increased steadily since the end of the nineteenth century.

Following is a table showing figures compiled by the United States Department of Commerce and Navigation:

| Year | Imports to the United States from Austria-Hungary | Exports from the United States to Austria-Hungary |
|---|---|---|
| 1895 | $2,125,772 | $6,510,319 |
| 1900 | 7,046,819 | 9,079,667 |
| 1901 | 7,222,650 | 10,067,979 |
| 1902 | 6,167,127 | 10,150,601 |
| 1903 | 7,156,688 | 10,569,929 |
| 1904 | 8,225,282 | 10,372,689 |
| 1905 | 11,623,746 | 10,553,204 |
| 1906 | 14,890,019 | 13,865,433 |
| 1907 | 15,136,185 | 16,009,629 |
| 1908 | 16,174,738 | 15,425,659 |
| 1909 | 14,226,703 | 15,436,587 |
| 1910 | 14,962,731 | 17,408,910 |
| 1911 | 19,514,787 | 16,958,099 |
| 1912 | 22,388,930 | 16,713,794 |

The chief articles of import from the United States are cotton and some machinery and other manufactured goods, while Austria-Hungary exports to us mainly beet sugar, glassware, pottery, furniture, millinery, jewelry, and beans.

No account of Austro-Hungarian commerce would be complete without some reference to the amount and nature of the commerce between the two halves of the monarchy. The preponderantly industrial activity of Austria and the agrarian activity of Hungary is shown by the fact that in round numbers, 10 per cent of Austria's exports to Hungary is raw material, 12 per cent is unfinished goods, while the balance is finished manufactures. In return Hungary sends her 57 per cent raw materials, 7 per cent unfinished goods, and only 36 per cent finished manufactures.

The raw materials sent from Hungary to Austria consist almost exclusively of animals, cereals, flour, and other foods.

**Banking.** The banking system of the monarchy is quite simple. It centres in the Austro-Hungarian Bank, with headquarters at Vienna and Budapest, 71 branches in the principal cities of the country and agencies in many other towns. This bank has the exclusive privilege of issuing paper money, and to that extent exercises even a more complete control over the monetary situation of the monarchy than the Bank of England does over that country. It was organized in 1816, under the name of the "Austrian National Bank," and from the beginning was endowed with the great powers it now enjoys. Except for the period lasting from 1848 till the middle of the sixties, when the country's resources were drained to exhaustion by the ravages of the Revolution and foreign wars, it has enjoyed great prosperity during its entire existence and has had a high reputation for stability and sound management. In 1877 it was recognized as the Austro-Hungarian Bank, in order to bring it into conformity with the new political status of the country. The charter of the bank, which expired in 1910, was renewed and extended until 1917. Its capital was increased in 1900 from 180,000,000 kronen ($36,540,000) to 210,000,000 kronen ($42,630,000). Its resources have steadily increased, and in 1912 its assets and liabilities balanced at 3,743,168,000 kronen (note circulation, 2,815,797,000; reserve fund, 28,408,000).

The most important bank next to the Austro-Hungarian Bank is the Austrian Credit Bank for Trade and Industry (*Oesterreichische Credit-Anstalt fur Handel und Gewerbe*). Its functions are the same as those of the large private banking houses of the United States; viz., the promotion of all kinds of industrial undertakings, and negotiating state and provincial loans. It was founded in 1855, with an authorized capital of $40,000,000, which was subsequently reduced to $16,000,000, and has branches in the largest cities of the country. Other important banks are: The Lower Austrian Discount Company, organized 1853 ($4,000,000); the Anglo-Austrian Bank, organized 1864, capital $7,000,000; the Austrian Territorial Bank (Länderbank), organized 1880, with $16,000,000, mostly French capital, invested in railways, mines, and foreign loans; the Union Bank; and the General Austrian Mortgage Bank (Bodenkredit-Anstalt), organized 1864. The latter advances loans on real estate by issuing mortgage bonds, which are sold in the open market, so that it practically serves as an intermediary between the real-estate owners and the capitalist who does the actual advancing of money. Nearly all of these banks have branches throughout the country. The Vienna Clearing House (*Giro und Cassen-Verein*), in addition to attending to ordinary clearing-house transactions (see CLEARING HOUSE), performs many other services for banks and business firms.

There are a number of other banks—savings, pawning, mortgage banks, etc. All in all, there were, at the end of 1909, 77 joint-stock and private banks (besides branches and agencies) in Austria, with assets and liabilities balancing at 10,125,119,000 kronen. This comparatively small number is due to the fact that the system of branch banking is in vogue. In Hungary the system of small independent banks is more in favor.

The postal savings-bank system has attained a high development in Austria-Hungary. Besides the savings department proper, in which deposits are accepted for the smallest amounts, there is a check department, in which the minimum deposits are fixed at $40. The use of the post office as a banking institution has proved of inestimable benefit to the business community. The postal savings department has been converted into a gigantic clearing house for the entire country. The number of postal savings banks in Austria increased from 5562 in 1896 to 6913 in 1911; the number of depositors in the savings department proper increased during the same period from 1,174,902 to 2,371,732; and the total deposits at the end of 1911 amounted to 671,197,509 kronen. The number of postal savings banks in Hungary increased from 3983 in 1895 to 4555 in 1911; the number of depositors increased during the same period from 276,565 to 823,251; and the total deposits at the end of 1911 were 116,522,000 kronen. The private savings banks of Austria increased from 488 in 1895 to 669 in 1911; depositors at end of 1911, 4,262,108; deposits, 6,045,174 kronen. Private savings (and some other) banks in Hungary numbered 1984 at the end of 1911, with 1,143,853 creditors and deposits amounting to 3,841,734,000 kronen (exclusive of 867,238,000 kronen on account current).

**Education.** Owing to the diversity of race and language which prevails in the various crownlands of Austria, the system of public edu-

cation presents many differences. In general, the organization and management of all public institutions of learning in Austria (Cisleithania) are left to the provincial authorities; but these are required to conform to a uniform scheme of instruction established by act of the Imperial Reichsrat and applied by the Minister of Public Instruction. School administration is under the supervision of local, district, and provincial boards, and district and provincial inspectors. The features common to all the crownlands are the division of educational institutions into primary, secondary, and higher schools, and the very low cost at which instruction in schools of all grades is imparted. Characteristic, too, of all the Austrian crownlands is the high degree of excellence which technical education has attained. The care of primary instruction is incumbent on the local communities, and attendance is compulsory at the primary schools between the ages of 6 and 14 (except in Carniola, Istria, Dalmatia, and Galicia, 6 to 12; and in Bukowina, 6 to 13). The course of instruction includes, besides the ordinary branches, the subjects of religion, physical training, and, in the case of girls, domestic science. In 1893 the number of national schools and grammar schools (*Volksschule, Bürgerschule*) in Cisleithania, in which elementary education was imparted, was 18,807, with a teaching force of 67,354 men and women and an enrollment of 3,160,837 pupils. At the end of 1910 there were 23,847 elementary schools (including 1245 private schools), with 108,006 teachers and 4,520,138 pupils; children of school age, 4,818,870.

Above the elementary schools are the *Gymnasia* and the *Realschulen*, offering courses of eight and seven years respectively. The *Gymnasia* prepare for the universities, the *Realschulen* for the technological institutes. For the support of the secondary schools, the state, the provinces, and the larger communes coöperate. In 1896 there were 182 *Gymnasia*, with a teaching staff of 3699 and an attendance of 59,975, and 84 *Realschulen*, with 1579 teachers and 26,429 students. In 1913 the number of *Gymnasia* was 343, and the enrollment 108,838, while the *Realschulen* had increased to 148 in number, with 49,151 students. Universities of Cisleithania, eight in number, supported by the state, are located at Vienna, Prague (two, German and Czech), Graz, Innsbruck, Cracow, Lemberg, and Czernowitz. Each comprises faculties of theology, jurisprudence and political science, medicine, and philosophy. The universities at Vienna and Cracow and the German university at Prague date back to the fourteenth century; and of these the first ranks among the foremost universities of the world, especially as to its faculty of medicine. In 1893 the number of professors and tutors in all these universities was 1140 and the number of students 13,528. In the winter of 1912–13 the combined faculties included 1900 teachers and the students numbered 30,591, of whom 2624, or 8.5 per cent, were women. In 1909–10 there were 49 theological colleges (of which 43 were Roman Catholic) with a total of 1941 students. Of the technological institutions, the most important are the seven state high schools at Vienna, Prague (two), Graz, Brünn (two), and Lemberg; the agricultural high school at Vienna, and mining academies at Leoben and Přibram. In addition, there are numerous schools of agriculture, forestry, and mining, industrial schools, military and naval academies, and schools of fine arts and music. In all, the special schools of Austria in 1909–10 numbered 5721, with 381,702 students. General culture is highest in the German-speaking crownlands (Bohemia included) and lowest among the Slavic races of Dalmatia, Galicia, and Bukowina.

Of learned societies, libraries, museums, and art galleries there is a very great number, the most prominent of which are the imperial academies of science at Vienna, Prague, and Cracow. The Imperial Library at Vienna possesses 900,000 volumes, and the library of the University of Vienna nearly 600,000. The periodical press increased in number from 2137 publications in 1894 to 3149 in 1903.

The educational system of Hungary is similar in its general outline to that of Austria, but differs from it in the greater uniformity of organization, due to the preponderating influence of the Magyar element in the population. The persistent attempt to make Magyar the exclusive language in the public schools has been a marked feature of educational policy in Hungary proper in recent years. Attendance at the elementary schools, grammar schools, and the so-called repetition courses (which three classes comprise the "primary" schools) is compulsory for all children between the ages of 6 and 15, and it is incumbent on all communes to provide, generally with the aid of the state, adequate facilities for elementary instruction. In 1894 the number of primary schools was 16,881, and the enrollment of pupils 2,270,584, or nearly 80 per cent of all children of school age. In 1910–11 there were 19,339 primary schools, with 47,487 teachers and 2,938,091 pupils; children of school age, 3,545,014. The *Gymnasia* and the *Realschulen*, which offer courses of eight years in preparation for the universities and technical schools, are supported by the communes, by the state, or partly by both. In 1894 there were 186 of these secondary schools, with a staff of 3230 instructors and 51,228 students. In 1910–11 there were 187 *Gymnasia*, with 3882 teachers and 63,544 students; and 42 *Realschulen*, with 1020 teachers and 14,072 students. The state maintains five universities, at Budapest, Kolozsvár (Klausenburg), Zágráb (Agram), Pozsony (Pressburg), and Debreczen, each with faculties of theology, law, medicine (except Zágráb), and philosophy. The universities of Pozsony and Debreczen were founded in 1912; the other three had, in 1911, 652 professors and 10,222 students (of whom 422 and 6858 at Budapest). Other institutions included the technical high school at Budapest, with 160 teachers and 1676 students; 49 theological colleges (29 Roman Catholic), 330 and 2153; numerous industrial schools, etc., with 9210 teachers and 143,290 students. The number of pupils in the elementary schools (included above in the primary schools) was 2,159,696. From 1903 to 1911 the number of periodicals increased from 1483 to 2019, of which 1493 were in Hungarian and 153 in German.

**Government.** The Austro-Hungarian monarchy is composed of the Empire of Austria and the Kingdom of Hungary (and Bosnia and the Herzegovina, former Turkish provinces annexed in 1908); it is a loose union of two independent states. The essential bond between them is their possession of a common ruler; the crown of both is hereditary in the House of Hapsburg-Lorraine, and the Emperor of Austria is at the same time

Apostolic King of Hungary. He is crowned at both Vienna and Budapest. The present dual system was adopted by the *Ausgleich* (agreement) of 1867, when the two countries, while retaining their complete independence in domestic affairs, agreed to establish a common administration for certain matters of state. Also by this *Ausgleich* (which is a general name for several treaties dealing with different subjects adopted at about the same time) Austria and Hungary were constituted a customs union, pledged to a common commercial policy, with a common coinage and system of weights and measures, a joint bank of issue, and a uniform control of monopolies and interstate railways. The departments of state common to both countries are those of finance, war, and foreign affairs, and in the functions delegated to the last two, there is apparent a general tendency to grant as little as possible to the common administration and to keep as much as possible for the national executive. The Minister of Foreign Affairs is charged with the supervision of the Emperor-King's household and with the maintenance of the diplomatic and consular service. The Minister of War is concerned chiefly with the organization and training of the troops, since recruiting and the regulation of the terms of service are left to the two parliaments. The duties of the Minister of Finance are confined to the administration of the customs, the balancing of accounts for the two other ministries, and the administration of the dependent territory of Bosnia and the Herzegovina. The proportion of the common expenses to be borne by the two countries is determined, according to the *Ausgleich*, every 10 years. In 1907 the agreement was renewed for 10 years, providing that the net proceeds of the common customs be applied to the common expenditure, and the remaining expenditure be satisfied by Austria in the proportion of 63.6 per cent and by Hungary 36.4 per cent. The former proportion was 65.6 for Austria and 34.4 for Hungary.

Practically all legislation necessary to render the work of the common departments efficacious, rests with the Austrian and Hungarian parliaments, but the ministries are controlled directly by two bodies known as the delegations, representing the parliaments of the two countries. Each delegation consists of 60 members, 20 of whom are elected by the Upper House and 40 by the Lower House. The delegations assemble at Vienna and at Budapest in alternate years, and deliberate apart, communicating only in writing. If they arrive at no agreement after three interchanges, they meet as one body and vote without debate. Evidently the system of dual government is not only cumbersome, but precarious, in that it depends for its continuance on the mutual good will of two contracting parties, each of whom keeps a jealous watch against the least ascendency on the part of the other. The activity of the common ministries is dependent on concurrent legislation by the Austrian and Hungarian parliaments; a refusal on the part of either to vote its proportion of the common expenses or its quota of troops may instantly paralyze the financial and defensive powers of the monarchy; and that such action is not at all improbable was shown in 1897, when that part of the *Ausgleich* establishing a customs union failed of renewal and was replaced by a reciprocity treaty later.

The Austrian Empire comprises the 17 crownlands represented in the Reichsrat (Parliament) at Vienna. Of these territorial divisions, diverse in race, language, and history, some, like Bohemia, Galicia, and Dalmatia, are titular kingdoms of which the Austrian Emperor is King; some, like Styria, Carniola, Upper Austria, and Lower Austria, are duchies or archduchies; the rest (except the free city of Triest) are variously designated principalities. As a result of this combination of sectionalism, based on ethnographical distinctions, with the personal rule of one man, the Empire partakes at the same time of the character of a federal state and of a centralized monarchy. The element of racial diversity influences also the relations between the crown and the legislative bodies. Parliamentary government, in spite of presenting practically all the outward forms it bears in England, for instance, has not attained anything like full development, for the reason that the various parties in the Parliament have not as yet been able to unite permanently in either supporting or opposing the crown. By playing off the different factions against each other, the Emperor has succeeded in retaining the balance of power, and in making the ministers his servants, though in law they are responsible to the Parliament. At the same time such incidents as the blocking of all legislation for months at a time—a thing which happens frequently in the strife of parties—afford him an opportunity for exercising his extra-constitutional powers in the matter of promulgating ordinances and decrees.

The constitution of Cisleithania is based, among other statutes, on the Pragmatic Sanction of 1713, on the patents of 1860 and 1861, and chiefly on the Fundamental Law of Dec. 21, 1867. It may be suspended at any time by a two-thirds vote of both houses of the Reichsrat. The Emperor is the source of law and justice; he legislates concurrently with the Reichsrat for Cisleithania and with the provincial diets (*Landtage*) for the crownlands. He has the power to make treaties, issue ordinances, grant pardons, appoint officials, and to summon, prorogue, and dissolve the legislatures. Through his ministers he may initiate legislation. In case of necessity he may suspend the constitution and legislate provisionally by ordinance. Every act of his, however, must be countersigned by a minister, and his extra-constitutional decrees must be countersigned by the entire ministerial Council.

The Reichsrat consists of a House of Lords (*Herrenhaus*) and a House of Representatives (*Abgeordnetenhaus*). The House of Lords, or Upper House, consisted in 1911 of 15 members of the Imperial family, 81 persons holding their seats by hereditary right, 5 archbishops and 8 bishops of princely rank, 5 untitled archbishops and 169 life members. The Lower House consists of 516 members, elected (under the law of 1907) by the equal and direct suffrage of all male citizens over 24 years of age. The representation of the different provinces in the Lower House of the Reichsrat is as follows: Lower Austria, 64; Upper Austria, 22; Bohemia, 130; Bukowina, 14; Carinthia, 10; Carniola, 12; Dalmatia, 11; Galicia, 106; Görz and Gradisca, 6; Istria, 6; Moravia, 49; Salzburg, 7; Silesia, 15; Styria, 30; Tirol, 25; Triest, 5; Vorarlberg, 4.

The Reichsrat assembles annually. The con-

sent of both houses is necessary to all treaties relating to commerce or necessitating the imposition of taxes as well as to all statutes and appropriations. Bills may originate in either house, but the annual budget and the recruiting bill fixing the quota of troops for the year must be presented to the Lower House first. Concerning the position of the Reichsrat in respect to the executive, something has been said above; its relation to the provincial diets may be summed up in the statement that the latter are vested with the power of legislation on all subjects not reserved to the Reichsrat, and that the matters so reserved are very numerous, including any interest that may concern two or more crownlands in common. In greater detail, the scope of the Reichsrat includes, in addition to those mentioned, the subjects of customs, coinage, communications, banking, corporations and trade, citizenship, domicile and census, religion and the right of association, the press and copyright, the general policy of public instruction, judicial legislation, and the organization of the executive and judicial departments.

The administrative work of the general government is divided into nine departments, comprising the ministries of the Interior, Finance, Defense, Agriculture, Railways, Justice, Commerce, Instruction and Worship, and Public Works. The heads of the nine departments, together with the premier and a minister without portfolio, constitute the ministerial Council. The civil service in Austria is characterized by its freedom from politics, elaborate automatism, and its marked tendency to intrude on the private life of the citizen. Though the Austrian constitution embodies a comprehensive bill of rights, acts which in their nature are serious limitations of the rights of the citizen are frequently justified as being embraced within the legitimate exercise of the police power. The constitutional restraints on the freedom of speech and of the press, and the right of association, are considerable, and their interpretation is left largely to executive officials.

*Provincial Diets and Local Government.*—The provincial diets of Cisleithania are in many cases the ancient assemblies, established in the different provinces before they were brought under one rule; the diets, therefore, are the rallying grounds of national parties, and in a way the internal political condition of Austria is affected as much by the attitude of the various provincial legislatures towards the general problems of government as by the relations of parties in the Reichsrat. The diets are unicameral, and comprise (1) the archbishops and bishops of the Roman Catholic and Greek Orthodox churches and the rectors of the universities within the crownland, and (2) the representatives of landed proprietors and the Chambers of Commerce, and the members elected by the rural communities and the towns. The size of the diets varies from 242 members in Bohemia to 26 members in Vorarlberg. The president of the assembly is appointed by the Emperor, who through this officer, as well as through the exercise of the right of prorogation and dissolution, exerts very considerable influence on the legislative bodies. The authority of the provincial assembly extends to questions of local government and local taxation, agriculture and public works, the control of the territorial domains, and the management of secondary schools and charitable institutions. The executive power is vested in a committee (*Landesausschuss*), consisting of a president appointed by the Emperor and a certain number of members elected by the diet.

For administrative purposes, each crownland constitutes a department (*Landesregierung*) under a governor (*Statthalter* or *Landespräsident*) appointed by the Emperor. The *Landesregierung* is subdivided into districts (*Bezirkshauptmannschaften*) and communes (*Gemeinden*). The police, as well as the civil power, is vested in the governor. He presides over the boards of education and of health and controls directly the magistrates of the towns and the heads (*Bezirkhauptmanner*) of the districts. There is no uniform municipal code in Austria, each provincial diet having the power to model the municipal government after its own fashion. But within each crownland there is perfect uniformity of administration except for some of the largest cities, such as Vienna, Prague, etc., which are governed under special charters. The common features of all the municipalities in Austria include a *Gemeindeausschuss*, or municipal council, elected generally for a period of three years by the members of the commune, and a *Gemeindevorstand*, or executive board, elected by the council. This board consists of a small number of men under the presidency of the burgomaster and carries out the decisions of the council.

Justice is administered in the first instance by 962 district courts, which try minor offenses and misdemeanors and hold prisoners for the higher tribunals. For the trial of more serious charges, there are 71 provincial and circuit courts of original jurisdiction. Cases involving severe penalties, or concerned with political and press offenses, are brought before the jury courts. Appeals are taken to the higher provincial courts, 9 in number. The court of last resort is the Supreme Court of Justice and Court of Cassation at Vienna. There are also numerous courts for the trial of special matters, such as commercial, revenue, and military cases. The Court of the Empire at Vienna decides questions of jurisdiction and cases involving conflict of laws. Before the High Court of Administration are brought all controversies between private citizens and public officials.

The *Kingdom of Hungary* comprises Hungary proper and Croatia and Slavonia. (Transylvania was formerly, and is still sometimes, not regarded as a part of "Hungary proper.") The constitution of the Kingdom is based on a series of statutes beginning with the Golden Bull of 1222, the charter of Hungarian liberties. The fundamental law of June 8, 1867, confirmed the sweeping reforms which the Revolutionists of 1848 had effected in abolishing old feudal privileges, extending the suffrage, and reconstructing institutions on a modern basis. Subsequent legislation has modified the constitution only in matters of detail and procedure. The King is bound by the same constitutional limitations as in his Austrian dominions; but, by reason of the greater homogeneity of the Lower House of the Hungarian Parliament, does not exercise so great an influence in its deliberations as over those of the Austrian Reichsrat. As in Austria, decrees must be countersigned by a responsible minister to acquire validity. The Hungarian Parliament is composed of an Upper House—the Table of Magnates—and a

Lower House—the House of Representatives. The Table of Magnates in 1906 consisted of 15 members of the royal family, 38 archbishops, bishops, and other dignitaries of the Roman Catholic and Orthodox Greek churches, 12 representatives of the Protestant churches, 229 hereditary peers, 60 life peers, 17 high officers of state, holding their seats ex officio, and 3 delegates from Croatia and Slavonia. The House of Representatives, which is chosen by the entire male population over the age of 20 (the qualifications being the payment of a small direct tax or the possession of a certain income), consists of 453 members (413 from Hungary and 40 from Croatia and Slavonia), elected for a period of five years. In the parliamentary scheme the Table of Magnates plays an important part. The majority of its members are great landowners, possessing extensive influence in the country, and as such often enter into opposition to the popular chamber. In the Parliament as a whole, the Magyar element is strongly predominant, and of the Magyars it is the gentry, or minor nobility, that make up the bulk of the House of Representatives and are the controlling political power of the country. The establishment of the Magyar supremacy has been steadfastly pursued in all walks of public life, and the Magyar language is the only recognized language in the courts and schools of Hungary proper, in the army, etc. Although the other races combined outnumber the Magyars, the only race that has received recognition from the Magyars is the Slavic race of Croatia and Slavonia. The Hungarian Parliament legislates for Hungary and for all affairs that are common to Hungary and Croatia and Slavonia. For purposes of local legislation—i.e., for such matters as agriculture, education, police, and many features of civil and criminal law—Croatia and Slavonia have a diet consisting of 7 ecclesiastical dignitaries, 26 peers and officers of state, and 90 representatives of the rural communes and towns.

The executive power in the Kingdom of Hungary is vested in a cabinet consisting of 9 ministers and a minister-president. The 9 ministers are those of (1) Finance, (2) Interior, (3) Agriculture, (4) Industry and Commerce, (5) Defense, (6) Justice, (7) Education and Public Worship, (8) Minister for Croatia and Slavonia, (9) Minister *ad latus*—i.e., near the person of the King. The ministers are responsible to Parliament. The chief executive in Croatia and Slavonia is the *Ban*, who stands under the control of the Hungarian ministers. Hungary proper (including Transylvania) is divided into 63 counties, at the head of each of which is a governor (German *Obergespan*), and 27 independent municipalities ("cities with municipal rights," or the "royal free cities"). The counties are subdivided into 111 incorporated towns, governed by magistrates, and 410 presidencies (*Stuhlrichterämter*), and the presidencies are further portioned out into greater and smaller communes. In these ultimate units the representative body is composed, half of deputies, elected by all males over the age of 20, paying a small tax, and half of the highest taxpayers in the communes. The executive power rests with a council appointed for varying terms in the rural and town communes. The presidencies have no legislatures, but are mere administrative divisions.

*Local Government.* The legislative bodies in the counties are elected by the qualified parliamentary electors of the district, and the *Obergespan* is assisted by a committee or council appointed for 10 years. In the degree of self-government the municipalities rank with the counties. Their representative bodies are created in the same manner as those of the communes, and they have their councils and magistrates. Croatia and Slavonia contain 8 counties, 4 cities with municipal rights, and 13 free cities. The counties are subdivided into communes, rural and urban, similar in their government to those of Hungary proper. The county legislatures are composed of representatives chosen by the parliamentary electors, of committees representing the municipalities and communes, and of the higher county officials.

*Justice.* In Hungary the tribunals exercising original jurisdiction comprise 458 district courts for the trial of misdemeanors, 76 circuit courts for the hearing of criminal charges and important civil cases, and 15 jury courts for the trial of press offenses. Appeals from the lower courts rest with the 12 Royal Tables of Justice, and in the final instance with the Royal Curia at Budapest, in Hungary, and the Supreme Court of Justice at Agram, in Croatia and Slavonia. There are besides a tribunal of Commerce and Exchange at Budapest, a Court of Admiralty at Fiume, a Central Court of Land Registry, and a Supreme Court of Discipline for military cases.

**Finance.** The cost of the administration of the "common affairs" of the Austro-Hungarian monarchy is borne by both states in a proportion agreed on by the two parliaments and sanctioned by the Emperor-King. According to the constitution, the agreement is renewable every 10 years. It expired in 1897, without an understanding having been reached. An arrangement, however, was finally effected whereby the proceeds of the common customs were applied to the common expenditure, and the remainder covered by Austria and Hungary in the proportion of 65.6 per cent and 34.4 per cent respectively. In 1907 the agreement was renewed for 10 years by the parliaments, Austria paying 63.6 and Hungary 36.4 per cent of the common expenses after the application of the proceeds of the common customs. Of the total charges 2 per cent is first debited to Hungary on account of the incorporation with it of the former military frontier. In 1905 the common expenditure was 438,070,000 kronen; in 1907, 433,529,000; in 1908, 514,376,000; in 1909, 643,578,000. Net receipts in the two latter years were 169,931,000 and 197,380,000 kronen; the net expenditure for 1908 was satisfied by Austria in the sum of 219,067,000 kronen and Hungary 125,378,000 kronen; for 1909, Austria 283,481,000, and Hungary 162,198,000. The provisional budget for 1913 showed an estimated expenditure of 503,974,188 kronen (of which 404,754,769 for the army and 74,757,210 for the navy); estimated net receipts from customs, 197,704,169 kronen.

In Austria revenue and expenditure have been as follows, in thousands of kronen:

| | 1907 | 1908 | 1909 | 1910 |
|---|---|---|---|---|
| Revenue ..... | 2,253,052 | 2,388,384 | 2,883,648 | 2,895,492 |
| Expenditure . . | 2,209,093 | 2,373,894 | 2,795,703 | 2,901,364 |

For 1912 the Austrian budget showed a revenue of 2,916,685,263 kronen (2,770,393,164 ordinary, and 146,597,180 extraordinary; expenditure 2,916,685,263 kronen (2,668,097,637 ordinary and 248,007,626 extraordinary). The larger items of estimated revenue were: railways, 822,584,010 kronen; excise, 391,947,100; direct taxes, 379,790,000; tobacco monopoly, 318,258,100; posts and telegraphs, 201,305,500. The larger estimated expenditures for 1912: railways, 637,566,780 kronen ordinary and 124,617,930 extraordinary; finance, 861,085,365 and 5,441,700 (including 505,797,962 for the public debt); common expense of the monarchy, 338,107,811 and 8,080,126; posts and telegraphs, 162,072,820 and 17,211,720; worship and public instruction, 105,117,244 and 8,196,440.

In Hungary revenue and expenditure have been as follows, in thousands of kronen:

| | 1907 | 1908 | 1909 | 1910 |
|---|---|---|---|---|
| Revenue | 1,395,711 | 1,531,368 | 1,750,783 | 2,074,549 |
| Expenditure | 1,399,477 | 1,616,245 | 1,721,564 | 1,901,666 |

In 1910 the ordinary revenue in Hungary amounted to 1,543,102,641 kronen; ordinary expenditure, 1,418,776,584; and total expenditure included 149,444,732 kronen for sinking fund. The budget for 1912 showed revenue 1,852,747,661 kronen (1,667,091,211 ordinary and 185,656,450 extraordinary); expenditure, 1,852,694,998 kronen (including 1,580,378,496 ordinary and 168,877,261 kronen for sinking fund). The larger items of estimated ordinary revenue for 1912 were: railways, 427,000,000 kronen; direct taxes, 287,010,000; excise, 270,000,000; tobacco monopoly, 185,267,000; posts and telegraphs, 95,545,000. The larger estimated ordinary expenditures, 1912: Ministry of Commerce, 430,221,650 kronen; Ministry of Finance, 249,592,018; Hungarian debt, 219,642,197; Ministry of the Interior, 101,112,054.

The public debt of Austria-Hungary is extremely large. By the agreement of 1867 the separate debts of the two countries were consolidated into a common debt of the monarchy. Since 1868 the new debts contracted by the two countries have been kept distinct, and interest paid out of the separate revenues of Austria and Hungary. While the common debt has been somewhat decreased, although very slowly, the separate debts have gone on increasing from year to year, until now they have grown to tremendous proportions, proving a great drain on the resources of the people. In 1887 the total indebtedness of the monarchy exceeded $2,114,000,000; in 1905 it had increased to $2,849,300,000; and in 1912 to about $3,746,000,000. On Jan. 1, 1912, the common debt amounted to 5,179,043,911 kronen. The Austrian debt on the same date was 7,061,628,314 kronen (of which 6,711,294,746 consolidated). Hungarian debt in 1910, 6,245,326,119 kronen (of which 4,083,872,000 consolidated). It should be noted that a considerable part of the Austrian and Hungarian debts has been incurred in the purchase or construction of railways and telegraphs.

**Army.** Since 1866 the armies of Austria-Hungary have been organized on what is practically a Prussian basis. The dual character of the Austro-Hungarian monarchy has greatly influenced the formation of the imperial army, since each state enjoys its own peculiar constitution and system of representation. Military service is universal in both Austria and Hungary. The forces are organized into the regular or common army, which may be reinforced by the Austrian Landwehr and the Hungarian Honvédség, followed by a Lausturm or levy-en-masse of each state, under the provisions of the Act of July 5, 1912, and earlier laws providing for compulsory service from the nineteenth to the end of the forty-second year. By the new law 2 years instead of 3 are spent with the colors, except in the case of cavalry, and 10 years in the reserve. Both common army and auxiliaries possess an *Ersatz*, or supplementary reserve, which includes conscripts not required for the regular army. Here the men are called out for varying short periods of training annually. The imperial ministry of war is the supreme nucleus of the entire military power. It is divided into 4 sections, which comprise 15 departments, and in which are united the different branches of the personnel of the organization, distribution of troops, administration, etc. Bosnia and the Herzegovina are organized similarly to Austria and Hungary. The yearly contingent of recruits, as provided under the law of 1912, was as follows: for the common army, 159,500 (of which 6000 were for the navy), for the Austrian Landwehr, 26,996; Tirol, 1023; for the Hungarian Honvédség, 25,000, and for the Bosnian troops, 7763, or a total of 220,282 men. From an annual enrollment of about 500,000 in 1912 about 170,000 recruits were put under training. The peace strength as stated in the budget for 1912 was as follows:

| Peace strength | Officers | Men |
|---|---|---|
| Common army | 23,256 | 313,081 |
| Austrian Landwehr | 4,650 | 45,397 |
| Hungarian Honvédség | 4,092 | 33,329 |
| Bosnian-Herzegovinian forces | 406 | 6,212 |

The application of the law of 1912 would, it was believed, provide for a war strength as follows:

| War strength | Men |
|---|---|
| Common army | 1,360,000 |
| Austrian Landwehr | 240,000 |
| Hungarian Honvédség | 220,000 |

In addition there would be the Landsturm, raising the total to over 4,000,000. The infantry is armed with the Mannlicher magazine rifle. The army is divided into 16 army corps, corresponding to appropriate territorial commands, with headquarters as follows: (1) Cracow; (2) Vienna; (3) Graz; (4) Budapest; (5) Pozsony; (6) Kassa (Kaschau); (7) Temesvár; (8) Prague; (9) Josefstadt; (10) Przemyśl; (11) Lemberg; (12) Nagyszeben (Hermannstadt); (13) Zágráb (Agram); (14); Innsbruck; (15) Sarajevo; (16) Ragusa. The following table gives the strength of the army on peace footing for 1912:

PEACE ESTABLISHMENT

COMMON ARMY, AUSTRIAN LANDWEHR, AND HUNGARIAN HONVÉDSÉG

| Common army— | Officers, Officials | All other ranks | Horses |
|---|---|---|---|
| Staff and Establishments.... | 6,420 | 13,302 | 1,005 |
| Infantry — 102 reg'ts of 4 battalions and 102 depot cadres | 10,806 | 158,194 | 2,395 |
| 4 reg'ts of Tyrolese Jagers of 4 battalions, and 4 depot cadres, and 26 independent Jäger battalions | 1,239 | 16,130 | 242 |
| 4 Bosnian-Herzegovinian reg'ts of 4 battalions and 1 Jager battalion. | 441 | 6,785 | 42 |
| Total infantry | 12,486 | 181,109 | 2,679 |
| Cavalry — 42 reg'ts of 6 squadrons and 42 depots | 2,049 | 43,915 | 40,909 |
| Field artillery (including horse, howitzer, and mountain batteries) | 2,339 | 31,413 | 16,724 |
| Fortress artillery — 6 reg'ts (14 batt's) and 7 ind. batt's | 544 | 8,149 | 27 |
| Pioneers (Engineers) 15 batt's | 525 | 8,506 | 15 |
| Railway and other technical troops | 136 | 1,591 | 4 |
| Medical corps | 106 | 3,039 | .... |
| Train 16 independent divisions and 16 depot cadres | 517 | 5,202 | 3,895 |
| Total common army | 25,172 | 296,126 | 65,258 |
| Austrian Landwehr — | | | |
| Infantry, 40 regiments | 4,415 | 37,454 | 1,737 |
| Cavalry, 6 reg'ts and 5 squadrons | 379 | 3,946 | 3,155 |
| Artillery, 16 battalions | 162 | 1,964 | 923 |
| Total | 4,956 | 43,364 | 5,815 |
| Hungarian Honvédség — | | | |
| Infantry, 28 regiments and depot cadres | 3,721 | 24,063 | 599 |
| Cavalry, 10 regiments and depot cadres | 469 | 4,517 | 4,872 |
| Total | 4,190 | 28,580 | 5,471 |
| Total peace establishment | 34,318 | 368,070 | 76,544 |

**Weights, Measures, and Money.** The metric system is in vogue throughout the monarchy. The monetary system is on the gold basis. The unit of value is the krone (crown)—equal to one-half of the old gulden or florin—and worth 20.263 cents United States money. A krone has 100 heller, the heller being equal to one-half kreuzer, the coin formerly in vogue.

**Population.** The growth of population from 1850 to 1910 was as follows:

| Year | Austria | Hungary | Total |
|---|---|---|---|
| 1850 | 17,534,950 | 13,191,533 | 30,726,483 |
| 1857 | 18,224,500 | 13,768,513 | 31,993,013 |
| 1869 | 20,394,980 | 15,509,455 | 35,904,435 |
| 1880 | 22,144,244 | 15,695,184 | 37,839,428 |
| 1890 | 23,895,413 | 17,463,791 | 41,359,204 |
| 1900 | 26,150,708 | 19,254,559 | 45,405,267 |
| 1910 | 28,571,934 | 20,886,487 | 49,458,421 |

(For figures of population by crownlands, see first table of this article.)

In Austria the 1910 census returned the number of Roman Catholics at 22,530,169 (78.85 per cent of the total population); Greek Catholics, 3,417,223 (11.96); Jews, 1,313,687 (4.60); Greek Orthodox, 666,458 (2.33); Evangelicals (Augsburg), 444,307 (1.55); Evangelicals (Helvetian), 144,379 (0.50); Old Catholics, 21,288. In Hungary (exclusive of Croatia and Slavonia) Roman Catholics numbered (1910) 9,010,305 (49.3 per cent); Reformed, 2,603,381 (14.3); Greek Orthodox, 2,333,979 (12.8); Greek Catholics, 2,007,916 (11.0); Evangelicals (Augsburg), 1,306,384 (7.1); Jews, 911,227 (5.0); Unitarians, 74,275 (0.4). Roman Catholics in Croatia and Slavonia numbered 1,877,833 (71.6 per cent); Greek Orthodox, 653,184 (24.9); Evangelicals (Augsburg), 33,759 (1.8); Jews, 21,231 (0.8); Reformed, 17,948 (0.7); Greek Catholics, 17,592 (0.7). In the monarchy (including Bosnia and the Herzegovina) in 1910, the total number of Roman Catholics was 33,952,368; Greek and Armenian Catholics, 5,453,019; Greek Orthodox, 4,479,357; Evangelicals (Helvetian), 2,766,568; Jews, 2,258,013; Evangelicals (Augsburg), 1,790,304; others and without confession, 790,594 (the last figure includes in Bosnia and the Herzegovina 33,758 military not classified by religion and 612,137 Mohammedans).

In 1910 there were but five cities in Austria-Hungary having a population of over 200,000: Vienna, Budapest, Prague, Triest, Lemberg. The census of Dec. 31, 1910, showed the following populations for the larger cities: in Austria —Vienna, 2,031,498; Triest, 229,510; Prague, 223,741; Lemberg, 206,113; Graz, 151,886; Brünn, 125,737; Czernowitz, 87,128; Pilsen, 80,343; Königliche-Weinberge, 77,120; Žižkow, 72,173; Pola, 70,499; Linz, 67,817; Przemyśl, 54,562; Innsbruck, 53,194; Smichow, 51,791: in Hungary—Budapest, 880,371; Szeged, 118,328; Szabadka (Maria-Theresiopel), 94,610; Debreczin, 92,729; Zágráb (Agram), 79,038; Pozsony (Pressburg), 78,223; Temesvár, 72,555; Kecskemét, 66,834; Nagy-Várad (Grosswardein), 64,169; Arad, 63,166; Hódmezö-Vásárhely, 62,445; Kolozsvár (Klausenburg), 60,808; Ujpest (Neupest), 55,197; Miskolcz, 51,459; Pécs (Fünfkirchen), 49,822; Fiume, 49,806.

**Birth and Death Rates.** Both show the same tendency to decrease that is so prevalent throughout the civilized world, the former due to increased uncertainty of occupation and greater willingness on the part of the population to check births, and the latter due to improved sanitation and higher standards of living. In Austria the (living) birth rate in 1860 was 38.4 per 1000, death rate 27.0, excess of births over deaths 11.4; in 1870, 40.0, 29.6, and 10.4; in 1880, 38.0, 30.0, and 8.0; in 1890, 36.9, 29.6, and 7.3; in 1900, 37.4, 25.5, and 11.9; in 1909, 33.3, 22.9, and 10.4. The marriage rate was 8.29 in 1900 and 7.54 in 1909. The percentage of illegitimacy in 1890 was 15; in 1900, 13.7; in 1909, 12.3. In Hungary (including Croatia and Slavonia) the (living) birth rate in the period 1891–95 was 41.7, death rate 31.8, and average annual excess of births over deaths, 9.9; in 1896–1900, 39.4, 27.9, and 11.5; 1901–05, 37.4, 26.4, and 11; in 1905, 36.1, 28.1, and 8.0; in 1906–10, 36.8, 25.1, and 11.7; in 1910, 35.6, 23.5, and 12.1. The marriage rate was 8.8 in 1901 and 8.6 in 1910. The percentage of illegitimacy in 1891–95 was 9.0; in 1906–10, 9.7; in 1910, 9.6.

**Emigration and Immigration.** In the 20-year period of 1879–1898 about 900,000 people emigrated from Austria-Hungary to North and South America, of whom 818,310 went to North America, 41,210 to Brazil, and 25,000 to Argentina. During the five years from 1899 to 1903 the total number of emigrants was 766,168, the greater part (747,638) going to the

United States, and the remainder to Canada, Argentina, Brazil, etc. For 1906 the oversea emigration of Austria and Hungary (and, in parenthesis, of Austria) is stated at 313,167 (136,354); 1907, 386,528 (177,354); 1908, 102,795 (57,734); 1909, 250,530 (129,808); 1910, 267,831 (138,867). The emigrants leave chiefly for the United States—in 1909, 170,191; in 1910, 258,737. Immigration is small and principally comes from Germany, Rumania, and Servia.

**Nationalities.** The population of the Austro-Hungarian monarchy embraces a greater number of races, distinct in origin and language, than that of any other European country except Russia. The Slavs are the most numerous race, amounting to over 47 per cent of the whole population. Next in order come the Germans (over 23 per cent), then the Magyars (nearly 20 per cent), while the Rumanians (over 6 per cent) occupy the fourth place. The Slavs form the bulk of the population of Bohemia, Moravia, Galicia, Carniola, Dalmatia, Croatia, Slavonia, and the north of Hungary. The Slavs are split up into a number of nationalities, differing greatly in language, religion, culture, and manners; so that their seeming preponderance in the monarchy is lost. These nationalities include the Czechs (the most numerous of all) in Bohemia and Moravia, the Poles in Galicia, the Ruthenians in Galicia and northern Hungary, the Croats and Serbs in Croatia and Slavonia, the Slovaks mainly in northwestern Hungary, the Slovenes in Carniola, Styria, Görz and Gradisca, etc., and the Morlaks in Dalmatia. The Slavs constitute about 59 per cent of the population of Cisleithania, the Germans nearly 35 per cent. Germans are dispersed over the monarchy, predominating numerically in Upper and Lower Austria, Salzburg, Tirol and Vorarlberg, Styria, and Carinthia. The Magyars, or Hungarians proper, constitute slightly less than 20 per cent of the population of the monarchy, less than 55 per cent of that of Hungary proper, and less than 49 per cent of the Hungarian Kingdom. Over 14 per cent of the population of the Hungarian Kingdom consists of Rumanians, who constitute about 55 per cent of the people of Transylvania. In Bukowina the Rumanians constitute over 34 per cent of the population. The other Romanic peoples of Austria-Hungary are the Italians, inhabiting the south of Tirol, Istria, Triest, and Dalmatia; the Ladins, occupying some valleys in Tirol; and the Friauls about Görz, north of Triest. The number of Jews in the monarchy is stated at 2,258,013 (1910), or about 18 per cent of the total Jewish population of the globe. The Gypsies are estimated to number about 100,000. There are more than 10,000 Armenians scattered over the eastern half of the monarchy.

The statutes regulating the relations of state and church insure the sovereign certain rights arising from the dignity of his office, but the law insures religious liberty and the independence of the church from the state. There is no religious test as a qualification for the possession of civil and political rights, and liberty of conscience is secure. The religious bodies have a legal right to manage their own affairs and to possess funds, estates; or endowments for the purposes of worship, instruction, or charity. But they must first secure their legal recognition from the Minister of Ecclesiastical Affairs, which is granted to all sects whose doctrines and practices are not inimical to the laws of the state.

## HISTORY

The nucleus of the dual monarchy was that part of the archduchy of Austria that lies south of the Danube and east of the Enns. In the earliest times, what is now the Archduchy of Austria was inhabited by the Taurisci, a Celtic people, and later by the Norici. After the conquest of the latter by the Romans (14 B.C.), the land south of the river became the Roman provinces of Noricum and Pannonia, in the latter of which was the municipal city of Vindobona (Vienna). Tirol formed part of Rhætia. All these boundaries were swept away by the irruption of the northern peoples, and the regions in question were occupied in succession, during the fifth and sixth centuries, by the Boii, Vandals, Suevi, Herules, Gepidæ, Goths, Huns, Longobards, and Avars. After the Longobards had settled in Italy, the Enns came, about 568, to be the boundary between the tribes of German origin and the Avars, a people who had come from the East. The Avars in 788 crossed the Enns and fell upon Bavaria, then part of the Frankish Empire; but Charlemagne drove them back (796) as far as the Raab and brought the district from the Enns to that river under his rule. He sent colonists, mostly Bavarians, into the new province and appointed a margrave over it. As the Franks gradually lost their power, the country was again invaded. It came into the possession of the Hungarians before 900, but was reconquered by Otho I in 955 and reunited with the German realm. See HUNGARY.

In 976 the Emperor Otho II appointed Leopold of Babenberg margrave of the reconquered province, and his dynasty ruled this frontier region of the Holy Roman Empire for 270 years. Their possession came to be known as Oesterreich, or Eastern Realm, a name Latinized into Austria. Under Henry Jasomirgott (1141–77) the Mark above the Enns was annexed to the lower Mark, the enlarged province raised to a duchy, and important privileges were conferred on the new Duke and his heirs. Duke Henry removed his capital from the Leopoldsberg to Vienna. He beautified the city, and began the building of the cathedral of St. Stephen. Under his successors Styria was united with Austria. Under Leopold VI, the Illustrious (1198–1230), the Austrian realm reached a high stage of prosperity. The Babenberg line became extinct with his successor, Frederick, who fell in battle with the Magyars (1246). An interregnum ensued. The Emperor Frederick II treated the duchy as a lapsed fief of the Empire, but claims to its possession were set up while the Empire was distracted by the contests between rival emperors. The states of Austria chose Ottakar, son of the King of Bohemia, as Duke in 1251; he became King of Bohemia in 1253, and in 1261 this powerful monarch made himself master of Styria. He subsequently, in 1269, came by inheritance into possession of Carinthia. Ottakar refused to acknowledge Rudolph of Hapsburg as Emperor, and a war ensued in which he was vanquished. He was compelled to give up Austria, Styria, and Carinthia to Rudolph. The struggle was soon renewed, and Ottakar lost his life in the battle on the Marchfeld (1278). Shortly afterward the Emperor (1282) conferred the duchies of Austria and Styria on his sons, Albert and Rudolph.

Fostered by the Hapsburg family policy, which was maintained for centuries without regard to its effect upon Germany, the power of Austria and the Hapsburgs grew together. Albert, while attempting to subdue the rebellious Swiss, was murdered near Rheinfelden (1308) by his nephew, John of Swabia, whom he had deprived of his hereditary possessions. Frederick the Handsome, one of his sons, was chosen (1314) by a party to the Imperial throne, but the election was contested, and he was defeated (1322) by his rival, Louis of Bavaria. The house of Hapsburg was already so powerful that it excited the jealousy of the German princes. Another of the sons of Albert, Leopold, was defeated at Morgarten (1315) in his attempt to reduce the Swiss cantons which had thrown off their allegiance under Albert I. At last, on the death of all his brothers, Albert II reunited the Austrian possessions. After his death (1358), two sons, Rudolph and Albert III successively followed in the Duchy of Austria. Another son, Leopold, held the other lands, but lost his life at Sempach (1386), in seeking to regain the Hapsburg possessions in Switzerland. From Albert and Leopold were derived the two ducal lines of Austria and Styria (the latter afterward subdivided into the lines of Styria and Tirol). During Albert III's reign, Tirol and other districts were acquired by Austria. After his death (1395) the dukedom was held by his son, Albert IV. Albert V, who succeeded his father in 1404, and who married the daughter of the Emperor Sigismund, was chosen successor to that monarch in Hungary and Bohemia and was at the same time raised to the dignity of Holy Roman Emperor, as Albert II (1438). The Imperial dignity was henceforth uninterruptedly held by the Hapsburgs, with the exception of one brief interval, down to the end of the Holy Roman Empire in 1806. With Ladislas, Albert's son, the Austrian line of the house became extinct (1457), and its possessions went to the Styrian line. To this line belonged the Emperor Frederick III, who made Austria an archduchy, of which he came into full possession after the death of Ladislas and of his own brother, Albert, in 1463.

In 1477 his son, Maxmilian I, married Mary of Burgundy, daughter of Charles the Bold, and thus acquired the opulent provinces of the Netherlands. Becoming Emperor on the death of his father (1493), he gave the government of the Netherlands to his son Philip, added to the Hapsburg patrimony by districts annexed from Bavaria and Venice, and quickly made Vienna an important centre of German art and science. The marriage of the Emperor's son, Philip, with Joanna of Spain placed the house of Hapsburg on the throne of Spain and the Indies. Philip died in 1506; and on the death of Maximilian I, in 1519, Philip's son, Charles I of Spain, more powerful by his hereditary possessions than any other monarch in Europe, was elected German Emperor as Charles V. On account of his large interests outside of Germany, Charles was required by the electors to sign an agreement (*Wahlkapitulation*) to the effect that he would not further the interests of Spain at the expense of the Empire; and this practice was continued with his successors. In 1521 Charles relinquished the sole sovereignty over the bulk of the old hereditary possessions of the house of Austria to his brother, Ferdinand (originally joint possessor with him), the founder of the Austrian branch of the house of Hapsburg, as distinguished from the Spanish. In 1556 Charles V abdicated the Imperial throne of Germany and was succeeded by Ferdinand I. Ferdinand had married the sister of Louis II of Hungary and Bohemia, and after the death of that King on the field of Mohács, where the Turks laid low the power of Hungary, Ferdinand was chosen to succeed him in Bohemia, and was also elected King by a part of the nobles in Hungary. John Zápolya, Waywode of Transylvania, was chosen King of Hungary by the National party, and was supported by Sultan Solyman the Magnificent, who established the Turkish sway over a great part of Hungary, and whose forces laid siege to Vienna in 1529. After contests extending over 20 years, Ferdinand was allowed to retain possession of Upper Hungary on condition of paying an annual tribute to the Sultan. On the death of Ferdinand I, in 1564, his eldest son, Maximilian II, received the Imperial crown, together with Austria, Hungary, and Bohemia; a second son, Ferdinand, received Tirol; a third, Charles, obtained Styria and Carinthia. Maximilian II was fond of peace, tolerant in religion, and a just ruler. He died in 1576, and of his five sons, the eldest, Rudolph II, who had been crowned King of Hungary and of Bohemia, succeeded him as Roman Emperor. Under him the possessions of the Archduke Ferdinand of Tirol, who had married Philippine Welser, the beautiful daughter of an Augsburg burgher, reverted to the other two lines, Ferdinand's children not being considered noble. Rudolph II adhered to the old feudal usages, and was an incapable sovereign, leaving everything to his ministers and the Jesuits. His war with the Porte and Transylvania brought him little credit; and the Protestants of Bohemia, oppressed by the Jesuits, extorted from him a charter of religious liberty. He died Jan. 20, 1612, having already relinquished Hungary, the Archduchy of Austria, and Moravia, in 1608, and Bohemia, in 1611, to his brother Matthias, who succeeded him as Roman Emperor. Matthias concluded a 20 years' peace with the Turks and had his cousin Ferdinand, son of the Archduke Charles of Styria, third son of Maximilian II, chosen King of Bohemia, Hungary, and of the Romans. Bohemia refused to acknowledge the new King, who was a fervent Catholic, and chose the Elector Palatine, Frederick V, the head of the Protestant Union, as King. The States of Austria and the Hungarians were also refractory. Matthias died March 30, 1619, and Ferdinand II became Roman Emperor. Ferdinand conquered Bohemia and suppressed Protestantism there with a relentless hand. The events of the reign of Ferdinand II will be found treated in the article on the Thirty Years' War. Bohemia's right of election of its king and its patent of religious liberty were withdrawn. The war closed (1648) under Ferdinand's son, Ferdinand III (1637–57), a more politic prince and a better financier. At the Peace of Westphalia (1648) Austria had to cede her possessions in Alsace to France. Ferdinand III's son and successor, Leopold I, provoked the Hungarians to rebellion by his severity. Tökölyi received aid from the Porte, and Kara Mustapha besieged Vienna (1683), which was rescued only by an army of Poles and Germans under John Sobieski and Charles of Lorraine, who inflicted a crushing defeat upon the Turks. In 1687 Leopold I forced the Hungarians to make their

kingdom hereditary in the Hapsburg family. Prince Eugene compelled the Porte (1699) to give up the country between the Danube and the Theiss and, in 1718, to cede other important territories to Hungary. On the death of Charles II, the last of the Hapsburg sovereigns in Spain, the Archduke Charles, second son of Leopold I, claimed the crown in opposition to Philip V, grandson of Louis XIV. This led to the war of the Spanish Succession, during which Leopold died, May 5, 1705. He was of sluggish, phlegmatic character and wholly under the influence of the Jesuits.

His eldest son and successor, Joseph I, continued the war. He died childless, April 17, 1711, and was succeeded by his brother, Charles VI. The Peace of Utrecht (1713) secured to Austria the Spanish Netherlands, Milan, Mantua, Naples, and Sardinia (exchanged for Sicily in 1720). A curtailment of territory, however, soon ensued. At the Peace of Vienna (1735), which ended the War of the Polish Succession, Charles VI had to give up Naples and Sicily to Don Carlos of Spain, and part of Milan to the King of Sardinia, receiving only Parma and Piacenza instead. He also lost at the Peace of Belgrade (1739) a great part of the fruits of Eugene's conquests, giving back to the Porte Belgrade and the adjoining Servian territories, as well as the parts of Wallachia and Bosnia that had belonged to Austria. The Emperor conceded all these points with a view of securing adhesion to the Pragmatic Sanction, conferring the succession on his daughter, Maria Theresa, an object to which his whole policy for years had been directed.

With his death (Oct. 20, 1740) the male line of the Hapsburgs was extinct, and Maria Theresa assumed the government. Counter-claimants appeared, and the War of the Austrian Succession broke out. Frederick II of Prussia revived an old claim of the Hohenzollerns to Silesia and conquered it. The Elector of Bavaria, who was supported by the power of France (England taking the part of Austria), assumed the title of Archduke of Austria, was crowned King of Bohemia at Linz and Prague, and elected Emperor as Charles VII (1742). A long period of warfare now followed. The Hungarians rallied to the support of their Queen; Maria Theresa's rival, Charles VII, died; her husband, Francis, Duke of Lorraine, was elected Emperor, and the Hapsburg monarchy remained. But Maria Theresa lost various Italian provinces to Spain, and at the close of the Seven Years' War Prussia retained Silesia. At the death of Francis (1765), his son, Joseph II, became Emperor, and joint-regent with his mother, of the hereditary states. Collateral branches of the house of Austria were planted by the younger sons of Maria Theresa, the Archduke Leopold of Tuscany and the Archduke Ferdinand, who married the heiress of Este (see MODENA). In the first partition of Poland (1772) Austria acquired Galicia and Lodomeria, and Bukowina was ceded by the Porte in 1777. Maria Theresa died on Nov. 29, 1780. Her administration had been distinguished by unwonted unity and vigor, both in home and foreign relations.

Joseph II, now sole ruler, was an active reformer in the spirit of the enlightened despotism of the times, though often rash and violent in his mode of proceeding. He introduced economy into every department, mitigated the censorship of the press, granted liberties and rights to Protestants, abolished 900 convents, and revised the school system. But his reforming zeal and passion for uniformity in the diverse countries composing his scattered realm excited opposition; the Netherlands rose in insurrection, and other disturbances broke out, which hastened his end (1790). He was succeeded in the hereditary Hapsburg dominions, as well as in the German Empire, by his brother, Leopold II, who pacified the Netherlands and Hungary. When the progress of the French Revolution had begun to threaten the political stability of Europe, Leopold entered into an alliance with Prussia against the Republican propaganda, but he died March 1, 1792, before the war began. This was declared by his son and successor, Francis, in the same year. (See FRANCE.) By the treaty of Campo Formio (1797) Austria lost Lombardy and the Netherlands, but received most of the territory of the extinguished Republic of Venice (including Venetian Istria and Dalmatia). The war with France was renewed in 1799 and ended by the Peace of Lunéville (1801). In 1805 Austria engaged in a fresh struggle with Napoleon, who vanquished her forces and those of Russia at Austerlitz, on December 2. In the Peace of Pressburg, December 26, Francis had to give up his Venetian dominions and to cede Tirol to Bavaria. On the establishment of the Confederation of the Rhine, Francis laid down the dignity of Roman Emperor, which his family had held for nearly 500 years. In 1809 Austria once more defied the might of Napoleon, but the battle of Wagram broke her power, and in the Peace of Schönbrunn (Vienna) she had to part with a large portion of the old hereditary dominions of the Hapsburgs.

The humiliating Peace of Vienna was followed (1810) by the marriage of Napoleon with the Archduchess Maria Louisa, daughter of the Emperor Francis; and in March, 1812, Napoleon and Francis entered into an alliance against Russia. This unnatural alliance ceased abruptly, when the Russian campaign of 1812 had broken the power of the French Emperor. In August, 1813, Austria joined the anti-Napoleonic coalition of England, Russia, Prussia, and Sweden. Francis I took an active part, and Austria obtained full indemnity for her losses at the close of the war. In the remodeling of the map of Europe that took place at the Congress of Vienna (1815), Austria was reinstated in the possession of Lombardy, the Venetian territories, Tirol, and the territories wrested from her by Napoleon in 1809. Belgium was constituted part of the Kingdom of the Netherlands. Ferdinand, the Emperor's uncle, was restored to the Grand Duchy of Tuscany, of which he had been dispossessed by Napoleon.

During the period of the Restoration, and until the Revolution of 1848, Austria, her course guided by the subtle and reactionary statesmanship of Prince Metternich, exercised a powerful influence in European affairs. The Holy Roman Empire had ceased to be even a name, but the presidency of the reorganized German Confederation had fallen to Austria, and her policy toward the Germanic States was that of "divide and rule." Austria, Russia, and Prussia were closely allied in the interests of reaction. Every constitutional movement was stifled, and every aspiration toward nationality by the peoples composing the heterogeneous Austrian domains

was rigidly repressed. But under his superficial calm, the internal condition of the Empire was approaching a crisis. The bureaucratic system of government and police supervision produced only irritation and discontent. The strife of nationalities became keener; but the policy of playing these nationalities off against one another no longer succeeded. The Polish insurrection, which led to the incorporation of Cracow with the monarchy (November, 1846), had turned into a frightful rising of the peasantry in Galicia against the nobles. In the meantime the opposition to Austrian rule in Italy and Hungary was becoming uncontrollable, while discontent was rife among the Slavs of Bohemia, and even the states of Lower Austria insisted on some share in the management of the realm. Francis I had been succeeded in 1835 by his son, Ferdinand I, but there was no change of policy. The revolutionary movement was already in full swing in Italy, when the fall of Louis Philippe shook Europe to its foundation (February, 1848). A host of petitions and addresses was followed, March 13, by a popular movement in Vienna, to which the government and military, after a feeble resistance, succumbed. Metternich resigned; the right of citizens to bear arms and the freedom of the press were granted; the Emperor promised to convoke a consultative assembly from all parts of the Empire. At the same time the opposition in Hungary had carried their demand for an independent and responsible ministry, and the Emperor was not in a position to withstand it. On March 18 the insurrection broke out at Milan, and Radetzky, the military commander, was forced to retire on Verona. Venice rose and drove out the Austrians. In Vienna the power passed into the hands of the National Guards and the Students' Legion, the court finding it necessary to take refuge at Innsbrück. An insurrection broke out in Prague, which was repressed with bloody severity by Prince Windischgrätz (June).

The power of Austria began to recover first in Italy. Radetzky thoroughly routed Charles Albert, King of Sardinia, at Custozza (July 25) and reconquered Lombardy. The next success met with was in Croatia. The opposition carried on by the Croats under their *Ban*, Jellachich, to Magyar domination, produced a conflict of nationalities which the Imperial government was able to use in the traditional Hapsburg way. On September 28 the Imperial Commissioner, Count Lamberg, who was sent by the Emperor to dissolve the Hungarian National Assembly, was murdered at Budapest. The Assembly continued its sittings, and appointed Kossuth president of the committee of defense. The advance of Jellachich, who had been made Imperial commander in Hungary, upon Budapest, was successfully met by the Hungarians. On October 6 a bloody insurrection broke out in Vienna. The arsenal was stormed, and the war minister, Latour, murdered; the court fled to Olmütz, a committee of safety was appointed, the armed populace organized, while the Diet wavered between loyalty and revolution. In the meantime the military forces had withdrawn from the capital, and joined Jellachich, in order to meet the Hungarians, who were advancing to the aid of the Viennese. Windischgrätz now approached with an army and declared Vienna in a state of siege. The attack began on October 23, and after a resistance of eight days the city was taken by storm. A number of revolutionary leaders were condemned and shot. The Diet met at Kremsir, in Moravia, and a new ministry was formed, headed by Prince Schwarzenberg. But the vigorous policy thought to be necessary for the restoration of order and advocated by the Archduchess Sophia (mother of Francis Joseph) was foreign to the easy nature of Ferdinand I. The Emperor abdicated, December 2, and his brother, the Archduke Francis Charles, renounced his claims to the throne in favor of his son, Francis Joseph, who was declared Emperor. The Diet, proving intractable, was dissolved in March, 1849, and a constitution was granted providing for two elective chambers and a responsible ministry. The monarchy was reconstituted into a unified realm and the national autonomy of Hungary abrogated. At the same time, in the German National Parliament at Frankfort, Austria opposed the project of a confederated state or an empire under the leadership of Prussia. In Italy, on March 23, 1849, Radetzky inflicted upon Sardinia the decisive defeat of Novara, which was followed by the abdication of Charles Albert. The struggle in Italy was terminated in the following August by the surrender of Venice to the Austrians.

During the winter of 1848–49 the Hungarians had been gathering strength beyond the Theiss to meet the attack of Windischgrätz, who had entered Hungary in December, and whose advance had compelled the Hungarians to evacuate Budapest in January. On the opening of the spring campaign they took the offensive and were at first successful. Windischgrätz was succeeded in command by Welden, but the Imperial cause was not improved. The Diet at Debreczin proclaimed Hungary a republic, with Kossuth as governor; but Russian assistance at last enabled the Austrians to turn the tide. Kossuth resigned the civil and military power into the hands of Görgei, who laid down his arms to the Russians at Világos (Aug. 13, 1849). The surrender of Komorn, in September, completed the subjugation of Hungary, which was treated as a conquered country, and the captured patriots were dealt with by Haynau, who had succeeded Welden, with bloodthirsty rigor.

This completed the subjugation of the nationalities, and the spirit of the restoration soon showed itself. One important fruit only of the revolution remained—the abolition of feudalism. For a time the forms of the constitution of March, 1849, were retained; but the rigorous military government, and the surveillance exercised over the press, showed the real spirit of the new régime. Ultramontane influences were rampant. Finally, Jan. 1, 1852, it was announced that the constitution and the fundamental rights were abolished, trial by jury set aside, and the old press law revived. This was followed by still greater concessions to the clergy. For 10 years Austria persisted in her policy of reaction, undeterred by its paralyzing effect on the economic life of the nation or by the signs of impending revolution.

When the Eastern war broke out (1853–56), Austria's peculiar relations to Russia led her to remain neutral during the contest; but it was an armed neutrality, which silently warned Russia against aggressions on the Danube.

The unceasing movements in Germany and Italy toward national unity finally forced Austria out of her unyielding attitude. The government of Austria in Lombardy and Venetia was far from satisfactory. By means of secret

treaties Austria obtained a predominant influence in Parma, Tuscany, Modena, the States of the Church, and in the Kingdom of the Two Sicilies. That influence was exercised in the interests of despotism, and in opposition to the welfare of the people, whose wishes their rulers, backed by Austrian troops, were enabled to set at defiance. The question of Austria's position in Italy was brought by Cavour before the European Congress at Paris in 1856, but nothing direct resulted from the discussions. Sardinia, after all remonstrances of a peaceful kind had failed, began to arm. Austria demanded her immediate disarmament, on pain of war; but Sardinia, whose army was swelled with volunteers from every part of the peninsula, and who had previously entered into a treaty, offensive and defensive, with France, refused. Austria accordingly commenced hostilities by crossing the Ticino on April 29, 1859. On May 3 France, as the ally of Sardinia, formally declared war against Austria. The Austrian army was overthrown, and on July 11 Francis Joseph and Napoleon met at Villafranca and agreed on terms of peace, the chief condition of which was the cession of Lombardy to Sardinia. (See ITALY.) Immediately after this war the Emperor Francis Joseph began to turn toward schemes of a more liberal internal policy. The constitutional régime inaugurated in 1861 failed, however, to be acceptable to the Hungarians, and the antagonism of the Czechs of Bohemia, as well as of the Poles of Galicia, tended further to paralyze the efforts of the government.

Prussia, which since the Restoration had been content to remain in her subordinate position with regard to Austria in the German Confederation, now entered upon a new and energetic policy after the accession of King William I in 1861 and the calling of Bismarck into the ministry. A steady effort was made to draw the North German States close to Prussia. Austria was entangled in the complications of the Schleswig-Holstein affair (see SCHLESWIG-HOLSTEIN), and in 1864 she found herself involved with Prussia in a war against Denmark for the liberation of the two duchies. The convention of Gastein, in 1865, with respect to the government of the duchies was a makeshift not calculated to relieve the strain on Austria and Prussia. Austria sought to force the hand of Prussia by referring the settlement of the Schleswig-Holstein question to the German Diet. Prussia made a move by occupying Holstein, and the German Diet thereupon summoned the States to mobilize the federal army of execution against Prussia. The latter declared the confederation dissolved, invaded simultaneously Austria and the States that had joined Austria, and in the brief seven weeks' campaign that followed triumphed completely. The victory of the Prussians at Sadowa was followed by the Peace of Prague, which dissolved the old confederation, allowing reorganization without Austria. Italy had been the ally of Prussia, and although the Italian army and navy were defeated at Custozza and at Lissa, Prussia was able to exact the surrender of Venetia by Austria, which thus ceased to be either a German or an Italian power. See GERMANY; SEVEN WEEKS' WAR.

The catastrophe of Sadowa made it evident to the Austrian government that a radical change in the internal constitution of the Empire was necessary. Above all, the demands of Hungary, as formulated by her great spokesman, Francis Deák, had to be met. Under the influence of Chancellor von Beust, Francis Joseph effected a reconciliation with the Magyars on the basis of the restoration to them of their constitutional liberties. This settlement, known as the *Ausgleich* of 1867, established the Austro-Hungarian monarchy on the present dualistic basis. Under the guidance of her able foreign minister, Count Andrássy, Austria-Hungary took an important part in the settlement of the situation growing out of the Russo-Turkish War of 1877–78. The Congress of Berlin allowed her to occupy Bosnia and Herzegovina, which was effected only after a bloody struggle (1878). With the adoption of the *Ausgleich*, parliamentary government in Vienna was firmly established. The dual constitution of the monarchy, however, was far from putting an end to dissensions among the nationalities in the Austrian Empire. The Poles, the Slavs, and the Germans were equally clamorous in their demands for recognition. But concession to any one nationality served only to arouse bitter resentment among the other discordant elements and inspired demands for the official recognition of the local language and the erection of national institutions of learning. Parliamentary government was brought to a standstill for long periods by systematic obstruction. A new question was injected into the political sphere in 1905, when, largely as a result of conditions in Hungary and Russia, a formidable agitation for the establishment of universal suffrage took its rise. National party lines were obliterated for the time in this general movement of the lower classes for political recognition. The government, confronted by the difficulties of the Hungarian situation, yielded, and in 1907 enacted a law which provided for general manhood suffrage. The immediate result in the election of 1907 was a vast influx of new members with socialistic tendencies, a result which in the next succeeding election was yet more marked.

Henceforth Austrian foreign policy was more aggressive: Bosnia and the Herzegovina were annexed, Oct. 13, 1908; a programme of naval expansion was entered upon; and in the settlement of the Balkan imbroglio Austria took a prominent part. Race questions continued in the foreground including Italian irredentism, Czech hostility to the use of the German language in Bohemia, and the plots of the Serbs for the creation of a Greater Serbia. Friction with Serbia extending over many years finally culminated in the *impasse* following the assassination of the Austrian Archduke Ferdinand at Sarajevo in 1914. See WAR IN EUROPE.

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**AUSTRIAN LIP.** The thick lower lip which was characteristic of the Hapsburgs and survives to some extent to this day among some princes of that dynasty.

**AUSTRIAN POLITICAL PARTIES.** See POLITICAL PARTIES, *Austria-Hungary*.

**AUSTRIAN WOMAN, THE.** A contemptuous name for the French Queen, Marie Antoinette, at the time of the Revolution.

**AUTEUIL,** ō'tĕ'y'. Formerly a country village at the entrance of the Bois-de-Boulogne, now a western quarter of Paris. It is known as the residence of famous literary men, such as Boileau and Molière.

On the Butte Montemart rise the grand stands of the race course where steeple chases are held from February to December. The *Grand Prix d'Auteuil* ($25,000), on the second last Sunday in June, inaugurates the summer season.

**AUTO-** (Gk. *αὐτός, autos*, self), a combining form, as the first part of many English words, meaning *self, one's self, by one's self, one's own;* as, e.g., *autobiography*, one's biography, written by one's self; *autograph*, writing in one's own hand; *automobile*, a self-propeller.

**AUTOCHTHONES,** ą-tŏk'thŏ-nēz (Gk. nom. pl. *αὐτόχθονες, autochthones*, sprung from the earth itself, from *αὐτός, autos*, self + *χθών, chthōn*, earth). A Greek name for the original inhabitants—not immigrants—of a land, who, according to various local legends, sprang from the earth, rocks, or trees. The Athenians seem to have been especially proud of this name (see ATTICA), as indicating that they had always been in possession of their land, though the statement that the ancient nobles wore a golden cicada in their hair, to show their origin from the soil, seems to be due to a grammarian's misunderstanding of the *τέττιγες* (*tettiges*), which were probably golden spirals used to secure the hair. Some writers also spoke of the Arcadians and the early inhabitants of Italy as autochthones. (See ABORIGINES.) Earth-born *γηγενεῖς* (*gēgeneis*), though not properly autochthones, were the Greek giants, sons of Earth, who fought against the gods, and the Sparti of Thebes, who sprang from the dragon's teeth sown by Cadmus (q.v.). The name "autochthones" is now frequently applied to the original inhabitants of a country, like "aborigines." Consult Preller, *Ausgewahlte Aufsatze* (Berlin, 1864).

**AUTOCHTHONOUS,** ą-tŏk'thŏ-nŭs (for derivation, see AUTOCHTHONES). A term employed in the sciences of botany, zoölogy, and paleontology to indicate such plants, animals, or fossils as are indigenous to the places in which they are found. In botany and zoölogy the term is opposed to "naturalized." In paleontology such fossils as are of the remains of animals that have lived in the immediate vicinity of the deposits in which they afterward became entombed are said to be autochthonous to those deposits. On the other hand, such fossils as have been entombed in an earlier deposit (*a*) having been autochthonous to it, and through erosion and transportation have become separated from (*a*) and been reëntombed in a second deposit (*b*), are then said to be heterochthonous to the latter deposit (*b*).

**AUTOCRAT OF THE BREAKFAST-TABLE, THE.** A serial contribution to the *Atlantic Monthly*, by Oliver Wendell Holmes, in 1857–58. It is the narrative of alleged conversations at the breakfast-table of a Boston boarding house. Dr. Holmes is himself the autocrat and the chief talker, others being allowed to talk simply for the sake of variety. Subsequently published in book form (1858), the work has long been a popular favorite. Its flashes of wit, its excellent philosophy, and its graces of style give its author deserved rank with the most delightful essayists of our literature.

**AUTO DA FÉ,** ou'tō dä fā (Portug. *auto*, act, from Lat. *actus* + *da*, of the + *fé*, faith, from Lat. *fides*, Sp. *auto de fe*). The name given to the procession or ceremony which used to take place in Spain and Portugal at the execution of those condemned to death by the Inquisition. It was generally held on some great national holiday or in connection with the celebration of a royal marriage, the accession of a king, or the birth of a prince. At dawn the dismal tolling of the great bell of the cathedral gave the signal to begin the drama of the day, for as such it was looked upon by the people, who thronged to it in troops, believing that they did a good work in merely looking on. Men of the highest rank reckoned it prudent to give their countenance to the holy tribunal at these processions, and even grandees of Castile did not disdain to make themselves familiars of the Inquisition. The procession was led by the Dominicans, carrying the flag of their order and that of the Inquisition; next followed the penitents, on whom only penance had been laid; behind them, and separated by a great cross, which was borne before, came those condemned to death—barefoot, clad in the *sanbenito* (a yellow shirt inscribed with a list of the victim's crimes and painted over with pictures of damnation), and wearing a pointed cap on the head; then effigies of the fugitives, and lastly the bones of dead culprits, in black coffins, painted with flames and hellish symbols. The train was closed by the army of priests and monks. The procession went through the principal streets to the church, where, after a sermon on the true faith, the sentence was announced. In the meantime the accused stood before a crucifix, with extinguished torches in their hands. After the sentence had been read to them an officer of the Inquisition gave each one of the condemned a blow on the breast with his hand, as a sign that they were given over by that tribunal to the secular power;

on which a secular officer took them in charge, had them fettered, and taken to prison. A few hours afterward they were brought to the place of execution. If they made profession of the Catholic faith at the last moment, they were so far favored as to be first strangled; otherwise they were burned alive, and with them the effigies of the fugitives and the bones of the dead culprits. As a rule, the King, with his whole court, had to exalt by his presence the solemnity of the awful transaction. The celebration of the auto da fé began as early as 1257, though the death penalty was first imposed in 1481. Between 1481 and 1808 more than 340,000 persons suffered punishment at the auto da fé. Of these 32,000 were burned. Heresy was not the only crime thus punished, as is generally supposed, but all grave sins coming under ecclesiastical jurisdiction. The most elaborate auto da fé took place at Madrid, under Charles II, in 1680. America also has had its autos da fé, Mexico celebrating one as late as 1815—the latest recorded. See INQUISITION.

**AUTOGAMY** (Gk. *αὐτός, autos*, self + *γάμος, gamos*, wedding, marriage). Self-pollination, i.e., a transfer of the pollen of a flower to its own pistil. It is the opposite of allogamy (q.v.). See also POLLINATION.

**AUTOGRAPH** (Gk. *αὐτός, autos*, self + *γράφειν, graphein*, to write). That which is written in one's own hand. It commonly refers to the signature. A holograph is a writing or inscription entirely in the hand of one person. It is not necessarily in written letters or inscribed characters; an original drawing by Rembrandt or a musical score by Mozart is a holograph. On account of the personal interest with which handwriting is invested, as well as the historical value of documents actually written by famous men, the accumulation of autographs has been a favorite pursuit of collectors from very early times. There were large collections among the Greeks and Romans. One of the Ptolemies bargained with the starving Athenians, giving wheat for the privilege of copying holographs of Æschylus, Sophocles, and Euripides. He returned the copies and retained the originals. Pliny the Elder speaks of seeing in the collection of Pomponius Secundus autographs of famous men written two centuries previously. Among the Chinese also autographs were preserved with great respect in early times. During the sixteenth century, in Europe, rich collections were made, of which one, brought together as early as 1578, is in the British Museum. Even before this, the custom of inscribing autographs merely for collections had been developed, and there had appeared (first in Germany in the fourteenth century) the *Album Amicorum*—an octavo book, bound lengthwise, in which names and sentiments were inscribed. Such books were first used by travelers, who were thus enabled to bring home records of the eminent personages whom they had met during their journeys. Among the Egerton manuscripts in the British Museum is an album dated 1554. Afterward autograph albums came into general use and, indeed, were in fashion until the latter part of the nineteenth century.

The value set upon autographs by collectors has developed a class of dealers all over the civilized world who sell them either privately or at auction. Autographs are described in their catalogues as a.l.s. (autograph letter signed); l.s. (letter signed); d.s. (document signed); a.l.3 (autograph letter, third person); s. (signature cut from document or letter). The high prices paid for good signatures have encouraged forgeries. Sometimes forgeries take the form of fabricating literary matter, as when Chatterton produced the poems of Rowley, or when Ireland "discovered" an original play of Shakespeare. Generally these forgeries purport to be letters or documents written or signed by famous personages. In America and in England there have been several notable forgeries; but perhaps the most remarkable instance of deceit occurred in France. In 1867 M. Michel Chasles, the first geometrician of France, laid before the French Académie des Sciences letters ostensibly by Pascal, Rabelais, Galileo, and others. When seen by experts, these were recognized as forgeries. It was then discovered that Chasles had bought of a certain Vrain Lucas 27,000 pieces, among which were letters of Mohammed to the King of the Franks, Alexander the Great to Aristotle, Judas Iscariot to Mary Magdalen, and others, written in French, on French paper, bearing a *fleur-de-lys* water-mark. A skillful forger selects the guard-folios of old books, washing the ink with a weak solution of muriatic acid, oxalic acid, or an oxalate of potassium, after which the paper is creased and smudged.

The most notable collection of autographs in England is that of the British Museum. The most valuable autograph in this collection is that of Shakespeare, affixed to a deed; his signed will is preserved in Doctors' Commons. The most valuable private collection in England was formed by the late Alfred Morrison. The gems of the collection are considered to be a holograph letter of Americus Vespucius addressed to his father, and a letter of Mary, Queen of Scots, written to Henry III of France, six hours before her execution and confiding to him the care of her son "as much as he deserves it." In the French archives the earliest autograph is a document signed by Thierry III, Sept. 12, 677. One of the largest and most important collections in France was that formed by Benjamin Fillon.

In Germany one of the largest collections was formed by Alexander Meyer Cohn, of Berlin. In the United States the collections of Thacher, Gratz, Gunther, and others, covering both domestic and foreign fields, compare favorably with the best in Europe. In the first of these the kings of England are represented in an unbroken line from Henry V; and the kings of France from Charles V, mostly in holograph form. The finest collection of American autographs was formed by Dr. Emmet and is now in the New York Public Library. It contains the best set of the signers of the Declaration of Independence, including the only known holograph letter of Thomas Lynch, which was sold for over $5000. Dr. Emmet possessed autographs of nearly every member of the Continental Congress from 1774 to 1789.

The value of autographs depends not only upon the degree of fame of the writers, but also to some extent upon the rarity of the signatures. Among the rarest desirable names are those of Da Vinci, Raphael, the younger Bach, Gluck, and Charlotte Corday. Sir Francis Drake, Sir Thomas More, and Milton are exceptionally rare names. Shakespeare is unobtainable. The 29 Columbus autographs are owned exclusively by his descendants. The rarest names among American explorers are those of Champlain, La Salle, and Marquette. Among the signers of the

Declaration of Independence, Lynch, Gwinnett, Hart, Morton, Heywood, and Middleton, somewhat in the order named, are difficult to secure. A good holograph set of the "signers," with no cut signatures, would be worth $25,000. There are not more than 10 or 12 good sets now in private hands. The rarest President is Johnson, with Taylor coming next.

A respectable collection of autographs will contain from 5000 to 10,000 pieces. It is wise, for those who desire to begin a collection, to study the catalogues of dealers published during the last 40 years. Consult Scott and Davey, *Historical Documents* (London, 1891), which contains a bibliography on the subject of autographs. See HANDWRITING.

**AUTOGRAVURE**, ą'tō-grȧv'ûr. See AUTOTYPE.

**AUTO-INTOXICATION.** A form of chronic poisoning from the absorption of toxins resulting from disordered metabolic processes in the patient's own body. Auto-intoxication may arise from the altered functioning of certain organs; e.g., uremia from nephritis, or Addison's disease from affections of the suprarenal capsules. But, as commonly used, the term applies to a toxæmia having its origin in the absorption of the poisonous by-products of incomplete digestion in the intestinal tract; and caused by a deficiency, either in quality or quantity, of the digestive secretions, or excessive bacterial fermentation, or both. There is a failure to carry on the digestion, especially of nitrogenous substances, to its completion, and bacterial fermentation, with the generation and absorption of poisonous substances, results. The disorder usually has its beginning in incomplete mastication (people with bad teeth are very prone to suffer from auto-intoxication), overeating, particularly of meats and the so-called "rich" foods, together with a sedentary life. Among a myriad of symptoms which have been traced to or attend auto-intoxication, the following may be mentioned: indigestion, constipation, a depression of spirits, a sallow complexion, anæmia, headache, various neuralgic affections, hemicrania, and nasal catarrh. Many individuals who complain of "malaria" or "biliousness" are really suffering from intestinal poisoning. When symptoms such as the above arise and the cause is not obvious, and when on examination of the urine excessive amounts of indican, urobilin, and phenol are found, a diagnosis of auto-intoxication is reasonably certain.

Cure is often brought about simply by correcting dietic errors, reducing the amount of proteid food, substituting therefor cereals and fruits, and taking exercise in the open air. Metchnikoff fathered the theory that the infirmities of old age were largely due to intestinal auto-intoxication, and introduced the sour-milk treatment on the supposition that the lactic acid bacillus drove out and displaced many of the pathogenic bacteria. This treatment was widely adopted, but fell into disrepute largely because of the unreliability of milk-souring cultures put on the market. Metchnikoff found the Bulgarian bacillus the most potent, and to overcome the disagreeable odor given by this bacillus to milk, combined with it the *Bacillus acidi lactis aerogenes*. Brewers' yeast has been administered with the same end in view; and intestinal disinfectants or antiseptics such as salol, betanaphthol, and creosote are frequently used.

**AUTOLYCUS** (Gk. *Αὐτόλυκος, Autolykos*). A mythological character who lived on Mount Parnassus, father of Anticlea, the mother of Odysseus. Hermes had given him superior skill as thief and perjurer. Later writers represented him as the son of Hermes, and as possessing the power to metamorphose all that he stole; this led to his contest with the more wily Sisyphus (q.v.), who alone outwitted him, and became, according to one story, by Anticlea father of Odysseus. The contest of wits between two clever thieves is a common folk-tale among many peoples.

**AUTOLYCUS** (c.330 B.C.). A Greek astronomer and mathematician of Pitane in Æolia. He wrote works on the revolving sphere, *Περὶ κινουμένης σφαίρας* (*Peri kinoumenēs sphairas*), and on the rising and setting of the fixed stars, *Περὶ ἐπιτολῶν καὶ δύσεων* (*Peri epitolōn kai dyseōn*). There is an edition, with Latin translation and scholia, by Hultsch (Leipzig, 1885).

**AUTOLYCUS.** A waggish thief in Shakespeare's *Winter's Tale*, who robs the Bohemian shepherds under cover of selling them trinkets. By his petty villainies he effects the *lusus* of the play.

**AUTOMATIC TRAIN STOP.** See BLOCK-SIGNAL SYSTEM.

**AUTOM'ATISM** (Gk. *αὐτόματος, automatos*, self-willed, self-acting, from *αὐτός, autos*, self + *μάειν, maein*, to wish eagerly, to strive). A term variously defined in various departments of knowledge. 1. In philosophy, it is the equivalent of determinism (q.v.). 2. In psychology it is used specifically for the doctrine that the animals are unconscious automata (see ANIMAL PSYCHOLOGY), and also generally to cover all manifestations of involuntary bodily movement —reflex and secondary reflex movement, concomitant movements. (See ACTION.) 3. In pathology it denotes the simulation of voluntary actions by involuntary movements, consequent upon certain forms of brain disease. Consult W. B. Carpenter, *Mental Physiology* (Boston, 1891).

**AUTOM'ATON** (Lat. from Gk. *αὐτόματος, automatos*, self-moving). A piece of mechanism constructed to represent human or animal figures and actions. The construction of automata has occupied men's attention from very early times. As early as 400 B.C. the invention of a mechanical dove which could fly is credited to the Greek mathematician, Archytas, and there are numerous reports of curious automata having been invented at various times and by various persons from the thirteenth to the seventeenth century, most of which are open to considerable doubt. In 1738, however, it is authentically reported that Vaucanson, a Frenchman, exhibited in Paris an automaton representing a flute player which placed its lips against the instrument and produced the notes with its fingers exactly as a human being does. In 1741 this same mathematician exhibited a flageolet player which with one hand beat a tambourine, and in the same year he produced a duck which swam, dived, ate, drank, dressed its wings, etc., as naturally as its animated companion. Droz, a Swiss, is reported to have invented a sheep which would bleat and a dog guarding a basket of fruit which would bark if any of the fruit was removed, ceasing only when it was replaced. At the London Exhibition of 1851 Maillardet exhibited a bullfinch which fluttered its wings and gave the note of the bird which it represented. Houdin, the famous conjurer,

made a writing and drawing automaton which was operated by clockwork. The chess player of Kempelen was long regarded as the most wonderful of automata. It represented a Turk of natural size, dressed in the national costume, and seated behind a box resembling a chest of drawers in shape. Before the game commenced, the artist opened several doors in the chest, which revealed a large number of pulleys, wheels, cylinders, springs, etc. The chessmen were produced from a long drawer, as was also a cushion for the figure to rest its arm upon. The figure, not being able to speak, signified when the queen of his antagonist was in danger by two nods, and when the king was in check by three. The automaton succeeded in beating most of the players with whom it engaged; but it turned out afterward that a crippled Russian officer, a very celebrated chess player, was concealed in the interior of the figure, and that he used this means to escape from Russia, where his life was in danger. In 1875 Mr. J. N. Maskelyne exhibited an automaton under the name of "Psycho" which represented a seated human figure. To show that the contrivance was not operated by electricity, it was insulated by being mounted on a glass cylinder. This figure moved its head, and from a rack in front of it selected the cards necessary for playing a hand at whist. It would also work out calculations up to 100,000,000, showing the entire total of each calculation by opening a sliding door in a box. Another automaton named "Zoe," similar in appearance to the first and insulated in like manner, was designed by Mr. Maskelyne. This figure would draw the likeness of any person chosen by the spectators from a list of 200 names. Various other automata have been contrived at different times.

In its broad meaning an automaton is any mechanism which, upon receiving an impulse, will perform a certain cycle of motions by itself. In this sense watches and clocks, and particularly such complicated clocks as that in the cathedral of Strassburg, are automata. For the best books relating to automata representing human and animal actions, consult: Brewster, *Letters on Natural Magic* (London, 1834); Houdin, *Secrets of Conjuring* and *Memoirs of Houdin* (London, 1891); Ozanam, *Mathematical Recreations*, trans. by Hutton (London, 1854).

**AUTOMEDON** (Gk. *Αὐτομέδων*). A son of Diores; the friend and charioteer of Achilles in the *Iliad*, xvi, 145 ff.; ibid., xvii, 536 ff. After the death of Achilles Automedon became the attendant of his son Pyrrhus.

**AUTOMEDON** (Gk. *Αὐτομέδων*). The name of two epigrammatists of the Greek Anthology —one an Ætolian, the other a native of Cyzicus; one of the two lived probably in the reign of Nerva, the date of the other is quite unknown.

**AUTOMOBILE**, ą'tō-mō'bĭl *or* ą'tō-mō-bēl' (Gk. *auto*, self, + Lat. *mobilis*, movable). A term applied to a vehicle for use on roads or highways whose propulsive or tractive energy is supplied from a mechanical motor within the body of such vehicle and which should operate independent of any track. It is of French origin and is an adjective used as a noun; in its first uses it was applied only to pleasure vehicles or carriages. The term was created to meet the sudden demand for a word to describe a horseless or self-propelling vehicle, but the make-up was unfortunate, and the word is gradually being supplanted by less indefinite terms. The convenience, economy, capacity, speed, and other advantages resulting from a substitution of mechanical power for animal traction has resulted in an enormous extension of the principle of the motor-propelled vehicle outside of its first uses in pleasure carriages. The commercial uses in carrying freight and passengers in an income-producing or industrial way, have made the term "motor vehicle," "motor car," or "motor truck" much more expressive and correct. The historical development of the motor vehicle will therefore be presented here, and the reader referred for the other divisions of the subject to the article Motor Vehicle. The British never welcomed the term "automobile," but have adopted the term "motor car" for the pleasure vehicle or passenger carriage. American practice and terminology is rapidly turning in the same direction. The idea of the mechanically propelled vehicle for roads is as old as the early days of the steam engine. In 1680 Sir Isaac Newton proposed a steam carriage to be propelled by the reactive effect of a jet of steam issuing from a nozzle at the rear of the vehicle. In 1790 Nathan Read patented and constructed a model steam carriage in which two steam cylinders operated racks running in pinions on the driving shaft. In 1769–70 Nicholas Joseph Cugnot, a Frenchman, built two steam carriages. The larger of these is still preserved in Paris and was designed for the transportation of artillery. The engine of this vehicle consisted of two 13-inch single-acting cylinders, connected by means of pawls to the single front wheel of the wagon. In front of this wheel was suspended a tank-like boiler. In 1784 Murdock, an assistant of James Watt, constructed a model carriage, operated by a "grasshopper" engine, and in 1786 Oliver Evans, of the United States, suggested the use of steam road wagons to the Lancaster Turnpike Company of Maryland. In 1802 Richard Trevithick built a steam carriage, which was exhibited in London, having driven itself 90 miles from Camborne, where it was built, to London. This carriage brings us to the notable period of steam-coach construction in England, which lasted until about 1836.

**First Period of Development.** The most important of these early labors on the motor vehicle were undoubtedly those of Walter Hancock, an Englishman, and they were carried out during the period between 1824 and 1836. Hancock's first work was the invention of a rather remarkable design of boiler, which reached its final improved form and was patented in 1827. This boiler was first applied to an experimental vehicle which had three wheels, the single wheel in front being the driver and being driven by a pair of direct-acting, oscillating steam cylinders. The frame which carried the steam cylinders and the front wheel was jointed to the main frame of the vehicle so as to permit steering. Many hundred miles were run with this vehicle, which was succeeded by an improved model. This second Hancock steam wagon was named "The Infant." In it the two rear wheels were made the driving wheels. The oscillating cylinders operated directly a counter-shaft carrying a chain wheel and located just back of the rear wheels. From the chain wheel on the counter-shaft a chain drive was carried to a similar wheel on the rear axle. The boiler and other mechanism for motive purposes was carried substantially over the driving wheels. The front wheel was used for steering by being joined to a swiveling frame. The chief objection

to this second vehicle was the trouble experienced from dust and dirt getting into the driving mechanism. The second "Infant" was then built, in which a vertical engine replaced the oscillating steam cylinders of the previous vehicles, and was placed near the middle of the vehicle, between the front and rear wheels. This engine drove a chain wheel with a chain drive extending back to the rear axle. The remaining parts of the vehicle were similar to the corresponding parts in the first "Infant." Hancock next built "The Era" on much the same designs as the second "Infant," and later "The Enterprise," both of which were designed for public traffic as steam-coaches. "The Autopsy," a second "Era," and "The Automaton" followed in rapid succession, and "The Automaton" ran as a coach on regular service between Stratford, Paddington, and Islington for 20 weeks, covering 4200 miles, and carrying 12,761 passengers during this period. Hancock's final motor vehicle was for his personal use.

Contemporary with Hancock, two fellow countrymen, Guldeworthy Gurney and Sir Charles Dance, conducted extensive experiments with a number of vehicles invented and improved by Gurney. For his vehicles Gurney used water-tube boilers and horizontal engines. The engine was placed underneath the body of the vehicle and drove the rear wheels by means of a connecting rod and axle crank, resembling much the driving gear of a modern locomotive. Gurney's water-tube boiler consisted of two cylindrical drums, placed one above the other and running transversely across the vehicle. The tubes connecting these drums were bent into the form of a letter U, placed horizontally, one free end of the U entering the lower drum and the other free end entering the upper drum, the furnace grate being formed by the lower tubes. This boiler was usually worked at pressures of from 70 pounds to 120 pounds. In passing from the boiler to the engine cylinders the steam pipe passed through the furnace casing, thus drying if not somewhat superheating, the steam. The fire was provided with forced draft by a fan operated by a small engine, and the exhaust of the main engine was employed to heat the feed water. Some idea of the size of Gurney's vehicles of the coach type is conveyed by the fact that their weight was nearly 8 tons, that the engine had 9 × 18-inch cylinders, and that the driving wheels were 5 feet in diameter. Gurney built a number of vehicles smaller than coaches, in some of which he substituted the engine exhaust for the original fan for producing draft. For one of Gurney's coaches Sir Charles Dance devised an improved form of boiler.

While the work of Hancock and Gurney perhaps takes precedence in these early experiments with the steam road vehicle, there were several other inventors who were active. In 1831 two steam carriages were built by William A. Summers and Nathaniel Ogle, capable of carrying from 16 to 18 passengers each. The boiler used in these vehicles was a vertical water-tube boiler with internal smoke tubes. The engines were coupled direct to the driving axle and had 8½ × 18-inch cylinders. In 1834–35 Macerone and Squire ran a steam coach having a capacity for 8 passengers, besides the driver and stoker, and weighing 3½ tons. The boiler was a vertical water-tube boiler and the engines had 7½ × 15¾-inch cylinders. Among others of this same period who developed inventions relating to steam vehicles were Henry James, Dr. Church, Robert Griffith, and Scott Russell. One after another of these vehicles was abandoned, until in 1836 only those of Hancock were on the road; and soon after these also disappeared from service.

**Second Period of Development.** With the disappearance of Hancock's steam vehicles about 1836, all practical, continued effort in the development of the motor vehicle ceased until about 1894, when the period of modern development began. What may be called a second period of development occurred, however, about 1860, when Thomas Rickett, A. F. Yarrow, A. Pattison, H. P. Holt, and others built several steam vehicles. Quite generally these vehicles approached the traction engine in character, having heavy boilers and engines and large water and fuel space, but room for only a few, usually for not more than four, passengers. They were, in fact, hardly more than self-moving boilers and engines with a few seats attached.

**Modern Period of Development.** Turning now to the modern period of development, in 1884 Gottlieb Daimler invented his small high-speed gas engine, followed in 1885 by his invention of a single-cylinder, inclosed-crank and fly-wheel engine. In 1885 the latter engine was applied to a bicycle. In 1886 Carl Benz invented his single horizontal cylinder, water-jacketed engine, which he applied to a three-wheel carriage. In 1889 M. Léon Serpollet invented his water-tube boiler, which he applied to a motor vehicle in 1894. About the same time also electric vehicles began to be developed in France and America. Modern motor vehicles, therefore, may be classified, according to the motive power used, into (1) steam vehicles, in which steam is generated in a boiler receiving heat from the external combustion of a coal, coke, or compressed fuel, or some form of oil, and is supplied to a steam engine; (2) oil or liquid-fuel vehicles, using internal-combustion engines with petroleum, kerosene, gasoline, or naphtha; (3) electric vehicles, using electric motors supplied with current from a storage battery. (See MOTOR VEHICLE.) Other forms of motive power, such as liquid air and compressed gases, have been suggested, but they are not practically employed, because not economically nor commercially successful.

**Selden Patent.** An important factor in the commercial and industrial history of the motor vehicle in the United States has been the Selden patent. An American patent was granted in 1895 to George B. Selden of Rochester, N. Y. (U. S. Patent No. 549,160). It covered the idea (novel at the time of his original application in 1872) of applying an internal combustion engine to the propulsion of a vehicle. It included the combination of such a motor with a clutch or similar engaging and disengaging device in the train of mechanism by which the motor drove the propelling wheels, and the use of reducing gear by which the propelling wheels could be driven at speeds lower than that of the motor shaft. The patent covered also means for throwing the clutch in and out and for adjusting the gearing. The wording of the claims at so early a stage of the art of making motor vehicles was so broad and inclusive that the existence of such a document gave its originator a dominating power over the industry. No successful motor vehicle could be made or operated without the elements combined in the Selden patent. Hence a powerful association was formed of the licensees under the patent; these

manufacturers agreed for self-protection to uphold the monopoly which it created during its life and to combat infringements by any not in the licensed class. All licensees paid a royalty on each machine sold, although this was not enough to affect the cost of manufacture and sale. The Association of Licensed Automobile Manufacturers (abbreviated into the A. L. A. M.), rallying around the basic patent agreement, were also interlocked on many other matters of commercial policy and technical and engineering development, whereby a wise tendency toward a standardization in non-essentials was secured, and an interchange of knowledge on tests and the properties of materials was made the custom of the industry. Rivals in business drew from this common stock. A mechanical branch was formed along the lines of the societies of engineers, and a testing laboratory was organized. A *Digest of Current Literature* was published weekly, which is still a mine of most valuable information on engineering facts and researches pertinent to the motor vehicle, and a monument to its compiler and editor, Coker F. Clarkson. As time went on, there arose a group of manufacturers who refused to recognize the right of the Selden patent to monopolize the field which it claimed. They insisted on their right to employ mechanical units which were generally in use elsewhere, without payment of royalties to a patent which had combined the same units for a particular purpose and claimed this combination as invention. Selden had also included in his claims a special type of internal combustion motor, in which the heating of the working charge of air and gas was to be effected at a constant temperature and pressure, or in accordance with the philosophy of the Brayton cycle, while the prevailing type of motor-vehicle engines work under the Otto cycle, where the heating is done at neither constant temperature nor pressure nor volume. These manufacturers resisted at law the charge that they were infringers of the patent as it should be properly interpreted, and were led in this contention by Henry Ford of Detroit, Mich., in the suit which resulted. Experts were secured by both parties in suit, and the record is one of the most voluminous in its class, and the litigation most costly. Testimony was taken from 1904 to 1908. The decision of the first trial under Judge Hough was in favor of the validity of the patent, and that those making motor vehicles without license and using the Selden elements were infringers. An appeal was at once taken, and on a retrial, by a decision written by Judge Noyes, the first decision was reversed, and the necessity for a license was denied in 1911. This decision ended the monopoly previously existing, but its good effects continued, and after the life of the patent had ended, an Automobile Board of Trade was organized to have a general oversight of matters of universal interest to the industry, which in turn was superseded by an Automobile Chamber of Commerce, which combines the activities of all the national automobile manufacturers' organizations.

**AUTON'OMY** (Gk. *αὐτονομία, autonomia*, self-government, from *αὐτός, autos*, self + *νόμος, nomos*, law). The power of self-government possessed by the citizens of the state, or enjoyed within certain limits by the inhabitants of some subdivision of a state, as well as by the members of civil and religious corporations. Autonomy is often used to designate the political condition of ancient Greece, where every town community claimed the right of independent sovereign action. At the present day the term is employed less frequently in the sense of independence than to describe the condition of a country which exercises complete control over its own affairs under the suzerainty of another power. It is in the latter sense that autonomy is used to characterize the status of such territories as Canada.

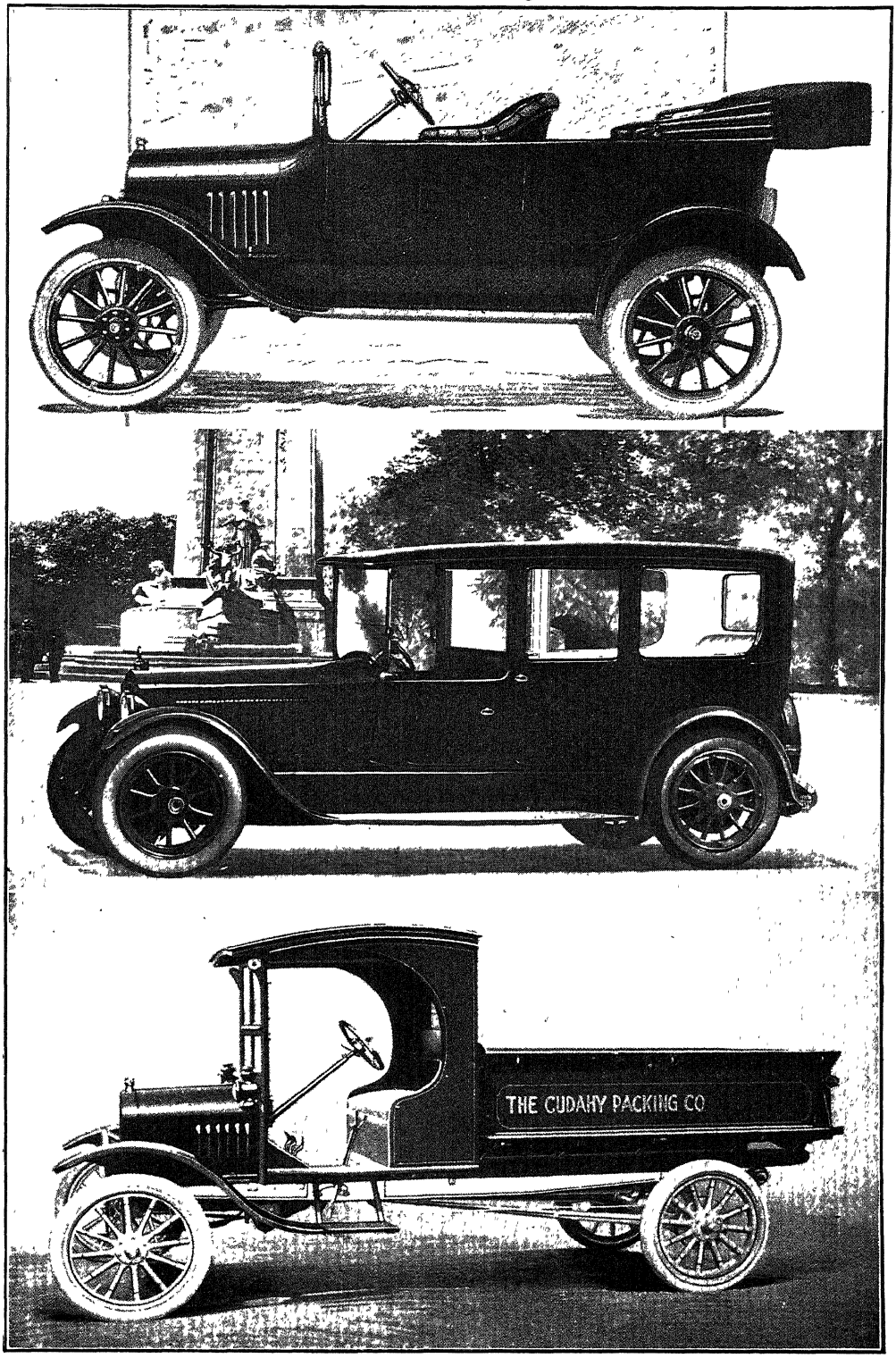
**AU'TOPHYTE** (*auto* + Gk. *φύειν, phyein*, to bring forth, generate). A plant (usually a green plant) which is independent, because it is able to obtain all necessary food materials directly from inorganic sources, as from the air and the soil, and subsequently to convert them into food. The dependent plants are either parasitic or saprophytic and are called "heterophytes" (q.v.). See SYMBIOSIS; SAPROPHYTE.

**AU'TOPLASTY** (Gk. *αὐτόπλαστος, autoplastos*, self-formed, from *αὐτός, autos*, self + *πλάσσειν, plassein*, to form). Any surgical operation for repairing one portion of the body with tissues taken from another part of the same individual. The defect may be due to a lack of development, as in harelip; to injury, as in scalds, burns, or mutilations; or to disease, as in lupus and syphilis. The skin is most frequently employed. It can be used as (1) a flap from the immediate vicinity carried over to the deficient area, but still receiving its original blood supply through a pedicle; (2) by totally separating and transplanting the flap; (3) by removing in small bits (Reverdin's method) or in strips of considerable size (Tiersch's method) only the superficial layers of the skin, and placing these grafts upon the denuded area. Autoplasty was practiced in India centuries ago, and there are references to it by Celsus, and later, by the Calabrian surgeons of the fifteenth century. About this period a favorite method of punishment in Italy and Sicily consisted in mutilation, cutting off the ears, nose, etc., and the Italian surgeons became famous for their skill in restoring members thus lost to their former situation; in fact, so skillful did they become that executioners were compelled to destroy the tissues removed. The subject is discussed in modern surgical treatises under the head of PLASTIC SURGERY.

**AU'TOPSY** (Gk. *αὐτοψία, autopsia*, a seeing with one's own eyes, from *αὐτός, autos*, self + *ὄψις, opsis*, look, sight). A personal observation. The word is most frequently used to denote the examination of a dead body, for the purpose of determining the cause of death or the alterations resulting from disease or injury. An autopsy is usually held by a medical examiner or coroner, in case of a person found dead, or dying without medical attention, or suspected of having been poisoned or otherwise murdered; or by physicians, in the course of studying diseases, or verifying a diagnosis in an obscure case.

**AU'TOSUGGES'TION.** Self-suggestion; a man's acceptance, for himself, without command or direction from any other person, of an idea that shall presently issue in action. Autosuggestion may be induced voluntarily or involuntarily—voluntarily, if we fix our attention upon the idea in question and impress it on our minds by attentive consideration; involuntarily, if we are unconsciously influenced by our surroundings. Many persons, e.g., can awake at a certain hour in the morning by suggesting to themselves, the night before, that they will do so; and it is

# AUTOMOBILES




FORD TOURING CAR
PACKARD TWIN-SIX LIMOUSINE
FORD ONE-TON TRUCK

probable that every one can, with practice, attain some degree of accuracy in such a "setting" of the mental machinery. The mechanism of arousal in these cases is not wholly clear. The cue for waking is, however, in all probability, given either by a definite amount of illumination of the sleeping room by the growing daylight, by certain constant noises of the environment, or by the pressure of water in the bladder of the sleeper. For the possibility of inducing hypnosis by autosuggestion, see HYPNOTISM.

Involuntary autosuggestion often plays an important part in psychological experimentation. It is sometimes desirable to make tests or experiments while the observer is, so far as possible, kept in complete ignorance of the object and arrangement of the investigation. (See PSYCHOPHYSICS.) The whole purpose of the "procedure without knowledge" may, in certain cases, be defeated by autosuggestion. As the work progresses, the observer involuntarily formulates an opinion as to its design—suggests to himself that he is expected to see this, and not that; to judge thus, and not otherwise: so that he is presently observing under a strong self-created bias. The tendency is perfectly well known and can be guarded against. Experimental psychologists have, indeed, classified laboratory observers as "objective" and "subjective" in type, upon the basis of the amount of self-suggestion to which they are liable.

Good instances of autosuggestion are to be found in the literature of suggestive therapeutics. One person is cured by a so-called "electric belt," another is invigorated by a band of unknown material fastened to the ankle, a third reads a faith-cure pamphlet and his rheumatism ceases. It is, however, in the hypnotic and other abnormal phases of mind—the hysterical consciousness, the religious ecstasy, the mind of the individual in the mob—that the phenomena of autosuggestion are most striking. Many phenomena which at their first appearance were regarded as evidence of supernormal powers and manifestations are reducible (fraud and trickery being eliminated) to autosuggestion. To quote from Jastrow: "The transportation of the senses discovered by Pététin (1787), the hypnotized subjects who, in Braid's day (1850), proved the location of the phrenological organs by the appropriateness of their actions when certain portions of the head were pressed; the sensitiveness to magnets and hermetically sealed drugs asserted by Reichenbach (1845), and later by Bourru and Burot (1885), and Dr. Luys's (1890) absurd trifling with puppets, and probably, too, Charcot's sharp differentiation of distinct hypnotic conditions (1882),—one and all furnish illustrations of the subtle possibilities of unconscious suggestion."

**Bibliography.** J. Jastrow, *Fact and Fable in Psychology* (Boston, 1900); Bernheim, *Suggestive Therapeutics* (Paris, 1889); Lipps, *Zur Psychologie der Suggestion* (Munich, 1897).

**AUTOTROPISM.** The internal tendency of a plant organ to straighten after it has curved from whatever cause, as from geotropism, heliotropism, etc.

**AU'TOTYPE** (*auto* + Gk. *τύπος, typos*, impression, type). A photographic print obtained by a gelatin process. Gelatin, when mixed with an alkaline bichromate, as that of ammonium or potassium, becomes insoluble after exposure to light, so that if a photograph be made on a gelatin film, only those portions which have been acted on by light will be retained. This fact has been made the basis of several photo-engraving processes. In the so-called autotype process the picture is printed directly from the gelatin, which is mounted on a ground-glass plate. In another process the gelatin film is used as a matrix for a plaster cast, from which in turn an electrotype is made, which then may be used for printing a photo-engraving. In Germany and Austria the word "autotype" is also applied to the ordinary photo-engraving or halftone print.

**AUTRAN,** ō'trăN', JOSEPH (1813–77). A French author, born at Marseilles. He first achieved celebrity by an ode dedicated to Lamartine and entitled *Le départ pour l'Orient* (1832). In the collections of verses entitled *Ludibria Ventis* (1838), and *Les poèmes de la mer*, he reveals the influence of classic models. A martial epic, entitled *Milianah*, celebrating the exploits of the French soldiery in Algiers, appeared in 1842, and a tragedy entitled *La fille d'Eschyle*, performed in the Paris Odéon, in March, 1848, met with great success and secured to its author (together with Augier's *Gabrielle*) the famous Montyon prize. (See MONTYON.) In 1868 he became a member of the Academy. His collected works have been published in 8 vols. (Paris, 1875–81).

**AUTREFOIS ACQUIT,** ō'tr'-fwä'ä'kē' (Fr. formerly acquitted), **AUTREFOIS CONVICT,** kŏN'vē' (Fr. formerly convicted). The common-law names of pleas in bar to a second indictment for an offense of which the defendant in a criminal prosecution has previously (Fr. *autrefois*) been regularly acquitted or convicted. It is a time-honored principle of English criminal law, that a person who has once been lawfully acquitted or convicted of any offense must not be put in peril a second time for the same offense; and this, notwithstanding the existence of circumstances of aggravation which, if known, would have justified an indictment of a different or more serious crime, or the discovery of fresh evidence not disclosed at the time of the former trial. The fact that there is a substantial variance between the former and the second indictment will not defeat the plea, so long as the original accusation or indictment was sufficient in law to sustain a conviction for the offense subsequently charged. But a previous trial for assault or arson will be no bar to a subsequent trial for murder, manslaughter, or rape resulting from or connected with the offense previously charged. The prior acquittal or conviction pleaded may have been had in any court of competent jurisdiction, domestic or foreign; and the common-law doctrine is not limited, as is generally believed, to capital or other grave offenses. It is in the latter form that it has found expression in the provision of the United States Constitution, that no person shall "be subject for the same offense to be twice put in jeopardy of life or limb" (Amendment V). Similar provisions are found in most, if not all, of the State constitutions. See JEOPARDY.

**Autrefois Atteint** is a similar plea, attended with the same effects as a former judgment in attainder (q.v.) offered in bar to an indictment or appeal for the same or any other felony. It has become obsolete with the practical abolition of the penalty of attainder. Consult the *Commentaries* of Blackstone and of Kent, and the authorities referred to under CRIMINAL LAW; CONSTITUTIONAL LAW.

**AU'TUMN** (Lat. *autumnus*). Astronomically, the third season of the year, in the northern hemisphere covering the period from the sun's crossing the equinoctial, at the autumnal equinox, about September 22, till it is on the tropic of Capricorn, at the winter solstice, December 22. Popularly the autumn in America is the three months of September, October, and November; and in England August, September, and October. The American autumn is often considered the most agreeable part of the year. South of the equator the seasons are, of course, reversed, and autumn extends from about March 22 to June 22.

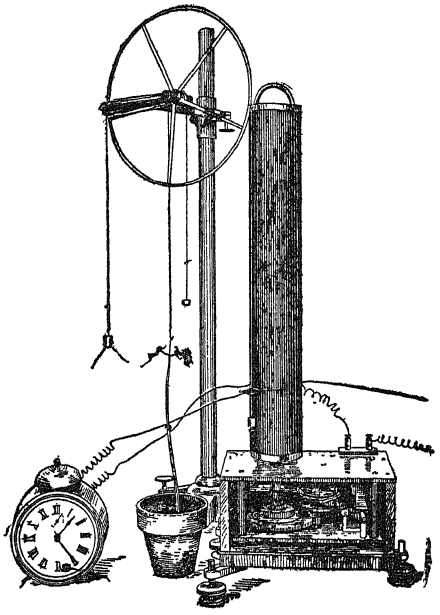
**AUTUN,** ō'tĕN' (Lat. *Augustodunum,* from Augustus + Gael. *dun,* hill fort; AS. *dun,* hill; Eng. *down*). A town of France, in the department of Saône-et-Loire (Burgundy), picturesquely situated at the foot of Mont-Jeu (Map: France, N., K 6). It is the see of a bishop, and has a cathedral of remarkable beauty, built in the eleventh and twelfth centuries. The spire belongs to the fifteenth century. Autun has a college, a diocesan seminary, several museums, a library, and is a busy manufacturing centre. Cloth, carpets, machinery, furniture, leather, and paper are some of the principal products. Autun arose near the site of the ancient Bibracte, the chief city of the Ædui. Under the Romans it was famous for its school of rhetoric. The town was pillaged by the Saracens in 725 and nearly destroyed by the Normans in 888. There still exist at Autun many ruins of Roman structures; most remarkable are the Roman gates, now called Porte d'Arroux and Porte Saint-André. At the Council of Autun (1094) King Philip I was excommunicated for divorcing his Queen, Bertha. Pop., 1901, 13,605; 1906, 15,479; 1911, 15,498. Consult Lewis, "The Antiquities of Autun," in vol. xl, *Archæological Journal* (London, 1883).

**AU'TUNITE.** A hydrous phosphate of uranium and calcium, crystallizing in tabular orthorhombic crystals which are lemon-yellow or sulphur-yellow in color. Autunite occurs principally in granitic rocks and is found in Connecticut, North Carolina, and in the Black Hills of South Dakota.

**AUVERGNE,** ō'vârn'y' (Lat. *Arvernia,* from Gæl. *Ar-fearaun,* high land, from *ard,* high). Formerly a province of south-central France, now included in the departments of Puy-de-Dôme, Cantal, and part of Haute-Loire. The mountains of Auvergne are the highest elevation in the interior of France, with summits over 6000 feet above sea level. They represent former volcanic activity on a grand scale, rising in huge conical peaks, which present a scene of wild desolation. The inhabitants are a simple and laborious people and are accustomed to emigrate each year after the harvest in large numbers to the neighboring regions, or to flock to the great industrial centres of France in search of employment, returning to their homes with their earnings in spring. The region was inhabited in ancient times by the powerful tribe of the Arverni, who ruled over a large part of Aquitania. In the Middle Ages Auvergne was a county. It was permanently united with the French crown in 1532. Consult *La Revue d'Auvergne,* vols. i–xiv (Clermont-Ferrand, 1884–97).

**AUWERS,** ou'vērs, ARTHUR (1838– ). A German astronomer, born at Göttingen. In 1859 he became assistant at the Astronomical Observatory of Königsberg; between 1862 and 1866 he carried on his astronomical work at the Observatory of Gotha and in the latter year was made astronomer to the Berlin Academy of Sciences. In 1878 he became perpetual secretary of the section of physics and mathematics of the Academy. He was chosen on the staff of editors of the *Vierteljahrsschrift* of the German Astronomical Society. Auwers's most important work was in connection with the Venus transits of 1874 and 1882, and he edited the results of German observers, whose work he organized. Among Auwers's numerous other contributions may be mentioned his completion of Sir William Herschel's nebular observation, his heliometric investigations in stellar astronomy, his observations of the proper motion of fixed stars, and the part he took in determining the positions of stars, based on the investigations of Argelander. From 1882 to 1903 he published *Neue Reduction der Bradley'schen Beobachtungen aus den jahren 1750 bis 1762* (3 vols.). In 1903 was printed *Vierzehn unbekannt gebliebene Königsberger Zonen und Catalog von 1309 darin beobachteten sternen für das Aequinoctium 1825.*

**AUX'ANOM'ETER** (Gk. *αὐξάνειν, auxanein,* to make large, to increase + *μέτρον, metron,* measure). A device for observing or recording the growth of plants during intervals too short



AUXANOMETER.

for direct measurement. The simpler forms of the auxanometer consist of a very light, balanced lever, whose fulcrum is so placed that the length of the long arm is a multiple of the length of the short arm. To the latter a thread from the growing plant is attached. The growth is thus magnified in the ratio of the long arm to the short, usually 10 to 20 times. The long arm traverses a graduated arc, from which its movement may be read, or it may be so placed as to trace its path on a moving smoked surface.

The more elaborate forms consist of a wheel with fine bearings and an accurately balanced rim, about 20 centimeters in diameter, grooved

to carry a thread. The same hub has a smaller wheel with a grooved rim, whose diameter is one-tenth or one-twentieth that of the larger. The wheel is supported on a suitable stand, and the plant to be studied is set beneath it. To the plant a silk thread is attached, carried around the small wheel, and weighted just enough to take up the slack by rotating the hub as the plant grows upward. Over the rim of the large wheel a similar thread is passed, carrying on one end a marker and on the other a counterpoise. The recording apparatus consists of a cylinder driven by clockwork and carrying smoked paper, the marker bearing against the smoked surface. The cylinder may be rotated continuously by clockwork. In that case once in 12 hours the marker describes a spiral line of steep or of low pitch, according to the rate of growth. The best forms, however, release the cylinder by means of an electromagnet, the circuit being closed by a clock, at intervals, when the cylinder is allowed to rotate a short distance (2 to 4 millimeters). This gives a broken line, whose vertical parts represent the growth during the intervals of rotation, and the horizontal parts the distance through which the cylinder turned. A great variety of forms embodying the foregoing principles have been devised and described.

**AUX CAYES,** ō' kā'. A seaport town of Haiti, situated on the south coast of the island (Map: West Indies, D 3). Its harbor is good and its export trade important, coffee being the principal commodity. It has several domestic industries. In 1816 at this port Bolivar fitted out his expedition to liberate the Spanish colonies in South America. Pop., about 25,000. It is the seat of a United States consular agent.

**AUXERRE,** ō'sâr' (anciently, *Autissiodorum*). The capital of the department of Yonne, France, on the Yonne, 90 miles southeast of Paris (Map: France, N., J 5). It was originally the see town of a bishop, but the bishopric was abolished by the Napoleonic Concordat, and its fine episcopal palace is used for the prefecture. It is situated on the slope of a hill, in a rich and beautiful district abounding in vineyards. The city is irregularly built; the streets are narrow and dirty; but its aspect from a distance is very imposing, the most prominent feature being the cathedral church of St. Etienne, a remarkably beautiful and imposing structure—one of the most important Gothic buildings in France, which dates from the thirteenth century. The Chapter of Auxerre was once one of the richest in France. The churches of St. Germain and of St. Pierre (sixteenth century) are interesting buildings. There is a curious old clock tower over a gatehouse, "with an ugly skeleton spire of iron bars." The ancient walls of the city have been converted into boulevards. It has a communal college, a hospital in the ruins of the old abbey of St. Germain, a museum of antiquities, and a botanic garden. The principal products are wine, calico, serge, woolen cloths, earthenware, and leather. The Yonne becomes navigable here, and large quantities of Burgundy wines are sent down it to Paris; there is also a considerable export trade in timber and charcoal. Auxerre was a flourishing town before the Roman invasion of Gaul. It successfully resisted the Huns under Attila, who only ravaged its suburbs. Clovis took it from the Romans. After his death it became part of the Kingdom of Burgundy. The English took it in 1359, but it was retaken by Du Guesclin. Charles VII gave it up to the Duke of Burgundy, and it was finally united to the kingdom of France by Louis XI. The Germans bombarded it in 1870. It is the birthplace of the famous Jacques Amyot, once bishop of the see, whose translation of Plutarch is a French classic. Pop., 1901, 16,291; 1906, 20,931; 1911, 21,929. Consult Freeman, "Sens and Auxerre," in vol. xxxix, *Archæological Journal* (London, 1882).

**AUXILIARY VERBS.** See VERBS; CONJUGATION.

**AUXONNE,** ō'sŭn' (for Fr. *Au Saône*, on the Saône; ML. *Aussonia*). A French fortress of the second class, in the department of Côte-d'Or, on the Saône, 17 miles southeast of Dijon (Map: France, N., L 5). The town has a sixteenth-century castle, now used as barracks; an arsenal, a school of artillery, a large powder magazine, and the church of Notre Dame, dating from the fourteenth century. Manufactures of cloth, plaster of Paris, bricks, leather, etc., are carried on, and there is a lively trade in these articles as well as in grain, vegetables, and lumber. Pop., 1901, 6135: 1906, 6307; 1911, 6303. The fortress was built by Vauban in 1673.

**AUX'OSPORES** (Gk. *αὔξειν, auxein*, increase + *σπόρος, sporos*, seed). The peculiar spores of diatoms which increase in size. See DIATOMACEÆ.

**AUZOUX,** ō'zōō', THÉODORE LOUIS (1797–1880). A French anatomist and physician. He is known as the inventor of the method of making permanent models of anatomical preparations, which are exceedingly important in teaching medicine and are used at present all over the world. He published *Leçons élémentaires d'anatomie et de physiologie* (1839).

**AVA,** ä'vȧ (for derivation see below). A ruined city of Burma, and repeatedly its capital; the honor having fluctuated at various times between it and Monchobo, Sagaing (on the opposite bank of the river), Amarapura, and Mandalay, the present capital. It stands in lat. 21° 51′ N., 10 miles southwest of Mandalay, on the left bank of the Irrawaddy. The river at this point is about 4000 feet broad, and receives two affluents, which are joined by a canal, rendering the city circumnavigable. The name is a Hindu and Malay corruption of Ængwa or Aæn-ua, meaning *fish pond*, as it was built where there were formerly fish ponds, of which some still remain; in official documents it is designated as Ratnapura, i.e., 'City of Pearls.' The city, which was 8 or 10 miles in circumference, is surrounded by walls and ditches and is almost a desert, having been reduced to ruins by an earthquake in 1839. The population, at one time estimated at 50,000, is very small. Several Buddhist temples, with gilded domes, give the city a deceitful appearance of grandeur. Consult Trant, *Two Years in Ava* (London, 1827).

**AVA,** ä'vȧ, more commonly KAVA (*Piper methysticum*). A plant of the family Piperaceæ, possessing narcotic properties. The ava is a shrubby plant, with heart-shaped, acuminate leaves and very short, solitary, axillary spikes of flowers. It is a native of many of the South Sea islands, where the inhabitants intoxicate themselves with a fermented liquor prepared from its root, or (more accurately) rhizome. The rhizome is thick, woody, rugged, and aromatic. The intoxicating liquor is prepared by macerating it in water. It is often prepared

much as the Indians of the Andes prepared *chica*, or maize beer—by chewing the root, depositing it in a bowl, straining through coconut husk, and mixing with water or coconut milk, after which fermentation speedily ensues. The taste is unpleasant to those unaccustomed to it. The intoxication is not like that produced by ardent spirits, but rather a stupefaction like that caused by opium. It is succeeded by a copious perspiration. The habitual use of ava is said to cause a whitish scurf on the skin. The leaf of the ava plant is in some places used with the betel nut, instead of that of the betel pepper.

**AVADHUTA,** ău'vâd-hōō'tâ. A member of the mendicant sect of self-torturing Saivites in the south of India. They abandon all worldly restraints and religious observances and have their passions under complete control.

**AVAL,** ä'vâl. The most important of the Bahrein Islands.

**AV'ALANCHE** (Fr. *avaler*, to swallow; originally, let fall down, from Lat. *ad*, to + *vallis*, valley). A mass of snow or ice that slides or rolls down the declivities of high mountains and often occasions great devastation. Avalanches are given various names, according to their nature. Drift or powder avalanches (*Staublawinen*) consist of snow which, loose and dry from strong frost, once set in motion by the wind, accumulates in its descent and comes suddenly into the valley in an overwhelming dust cloud. Avalanches of this kind occur chiefly in winter and are dangerous on account of their suddenness, suffocating men and animals, and overturning trees and houses by the wind driven in front of them. Another kind of avalanche resembles a landslip. When the snow begins to melt in spring, the soil beneath becomes loose and slippery, and the snow slides by its own weight down the declivity, carrying with it soil, trees, and rocks. This is also called a landslide and is often the cause of great disasters in mountainous regions. The greatest danger is where elevated tracts of moderate declivity are separated from the valleys by precipitous walls of rock; the softened snow of spring, beginning to roll or slide on these slopes, is hurled over the precipice with fearful force into the valleys. Ice avalanches are those that are seen and heard in summer thundering down the steeps, as those of the Jungfrau. They consist of masses of ice that have become detached from the glaciers in the upper regions, and are most common in July, August, and September. In the mountainous regions of the western United States avalanches are commonly termed "slides," and this term is also used to describe the mountain-side denuded of its vegetation by the avalanche. See LANDSLIP.

**AVAL'LENAU,** THE (Welsh, of the apple-trees). A poem of uncertain authorship, though accredited to Merlin, notwithstanding reference to events of the twelfth century. Morley quotes Stephens to the effect that the foundation of the poem is the tradition of 140 knights being changed into spirits in the Wood of Celyddon. The significance of the name becomes apparent when it is known that the Celtic heaven is an "island of apples." See AVALON.

**AVALLON,** ä'vä'lōN' (anciently Aballo). The capital of an arrondissement in the department of Yonne, France, 26 miles southeast of Auxerre (Map: France, N., J 5). It is built on a steep hill of red granite, nearly surrounded by the Cousin. A broad terrace walk, shaded with lime trees, extends around the town, about 500 feet above the bed of the river. The town is generally well built and has broad and clean streets. There are several fine edifices, among which is the church of St. Lazare, remarkable for its handsome Romanesque portals. Manufactures of various kinds are actively carried on, particularly of woolens, pastry, and paper; and there are distilleries, tanneries, glassworks, etc. There is also a considerable trade in wine and the produce of the neighborhood. Avallon is of Celtic origin. It was sacked by the Saracens in 731 A.D., and by the Normans in 843; taken by Charles VII in 1433, retaken by Philip the Good, Duke of Burgundy, in 1455, and pillaged by the troops of the League in 1593. Pop., 1901, 5906; 1906, 5848; 1911, 5900.

**AV'ALON,** variously written *Avallon*, *Avelion*, and *Avilion* (Welsh *Ynys yr Afallon;* see below). The name of the legendary island to which King Arthur was supposed to have been conveyed after being wounded in his last battle. It has been identified with various places, notably with Glastonbury, in Somersetshire. But it seems clear that in the first instance Avalon was nothing but the Celtic Paradise, or Happy Other-World, the abode of the fairies, which was visited by a number of heroes of Welsh and Irish saga. From it Arthur was expected to return ultimately, healed of all his wounds. The origin of the name is doubtful. *Ynys yr Afallon* is commonly understood to mean the 'Island of Apples,' with reference to the fruit that was often described as growing in the land of the blessed. But it is not to be assumed that the name had this meaning from the beginning. Perhaps it was at first not a local name at all, but rather personal. There is evidence of the existence of Avalloc (Welsh, *Afallach*), a King of the Other-World. Consult J. Rhys, *Studies in the Arthurian Legend* (Oxford, 1891), and F. Lot, in *Romania* (Paris, 1899). For the conception of the Happy Other-World as portrayed in the Irish Saga, consult Meyer and Nutt, *The Voyage of Bran* (2 vols., London, 1895-97).

**AV'ALON.** A peninsula forming the eastern part of Newfoundland, bounded by Trinity Bay on the north, and Placentia Bay on the south (Map: Newfoundland, G 5). Its coasts are highly indented, forming numerous bays and harbors. It contains the capital, St. Johns, and was the place of the first English settlement in Newfoundland in 1621.

**AVALON.** A borough in Allegheny Co., Pa., 6 miles by rail west of Pittsburgh, on the Pittsburgh, Ft. Wayne, and Chicago Railroad, and on the Ohio River. It is a purely residential city. Pop., 1890, 804; 1900, 2130; 1910, 4317.

**AVALOS,** ä'vä-lōs', FERNANDO FRANCESCO D', MARQUIS OF PESCARA. See PESCARA.

**AVARE, L',** lä'vär' (Fr. The Miser). One of Molière's comedies, based on the *Aululuria* of Plautus, first performed at Paris in 1668. In it the folly and shame of avarice are satirized in the ridiculous situations into which the leading character gets himself. The miser is Harpagon, who keeps his wealth in a casket of gold and rivals his son, Cléante, in the affections of Mariane. Cléante gets possession of the casket and gives his father the choice of it or of Mariane. Harpagon prefers gold to wife, and thus the two young lovers are happily married.

**AVA'RIS** (Egyptian *Hat-we'ret*, Lake city). A city of ancient Egypt, situated in the eastern part of the Delta; perhaps to be identified with Tanis, the modern Sân. Avaris was the stronghold of the Asiatic Hyksos, or Shepherd Princes, who invaded and subdued a portion of lower Egypt. The princes of Thebes resisted their encroachments, and a prolonged war ensued. Finally, about 1600 B.C., Aahmes I, the founder of the Eighteenth Dynasty, forced the foreigners to take refuge in Avaris, which he closely invested by land and by water. After a long and brave resistance the city was captured, and the Hyksos were driven into southern Palestine. Through this victory the independence of Egypt was secured, and Aahmes united the whole land under his sway. See AMASIS; TANIS.

**AVARS,** ă'värz, or **AVA'RI.** A tribe of eastern origin, which made its appearance a century later than the Bulgarians in the countries about the Don, the Caspian Sea, and the Volga. One part of them remained at the Caucasus, another part pressed forward (about 555) to the Danube and settled in Dacia. Here they served in Justinian's army and assisted the Lombards to overturn the kingdom of the Gepidæ, and about the end of the sixth century, under the mighty Khan Bayan, they conquered Pannonia. Later they made themselves masters of Dalmatia; pressed devastating incursions into Germany, as far as Thuringia, and into Italy, where they warred with the Franks and Lombards; and extended their dominion over the Slavs living on, and southward from, the Danube, as well as over the Bulgarians as far as the Black Sea. These nations at last rose against them and in 640 drove them out of Dalmatia. Confined to Pannonia, they were subdued by Charlemagne (in 791), and wellnigh extirpated by the Moravians, so that after 827 they disappear from history, those remaining becoming absorbed in the general European population. Keane, in his *Ethnology* (London, 1896), recognizes Avar traces in "the somewhat coarse Mongoloid features" of the so-called "Szeklers" of Transylvania (p. 309). They usually surrounded their settlements with fortifications of stakes driven into the ground, some traces of which, under the name of "Avarian rings," are yet found in the countries formerly occupied by them. The Avars belonged to the same great Finno-Tatar stock as the Huns, Magyars, etc., whose original habitat was somewhere in central Siberia.

**AVARS.** One of the Lesghian tribes of Daghestan, in the Caucasus, estimated to number about 100,000. They profess Mohammedanism and possess a written language with Arabic characters. They are noteworthy from the fact that the great Lesghian warrior and patriot, Schamyl (d.1871), who led the peoples of the Caucasus in their struggle against Russia, was an Avar. Deniker (1900) classes the Avars-Andi with the Dido, as one of the five great linguistic divisions of the Lesghian stock. Slight Mongolian resemblances, exaggerated by some authorities, do not indicate real relationship. See LESGHIANS; CAUCASUS.

**AVARY,** ă'vȧ-rĭ, MYRTA LOCKETT. An American author and social worker, born in Halifax, Va. For several years after completing her education she did editorial work on various New York magazines and contributed to the secular and religious press. She made special studies in social conditions in New York and became identified with fresh air and settlement work and with various metropolitan charities. She was afterward engaged in sociological and historical work in the South. In addition to contributions to periodicals on sociological subjects, she wrote: *Dixie after the War* (1906); *Joel Chandler Harris and his Home* (1913), and edited *A Diary from Dixie; A Virginia Girl in the Civil War* (1903); *Letters and Recollections of Alexander H. Stephens* (1910).

**AVATAR,** ăv'ȧ-tär' (from Skt. *avatāra; ava*, down + *tar*, to pass over). A term which primarily signifies, in Sanskrit, 'a descent,' but is specially applied to the descent of a Hindu deity upon the earth in a manifest shape, either for beneficent or for retributive ends. It is thus almost synonymous in its signification with the Christian term *incarnation*. The word is sometimes rhetorically employed in English literature. The ten avatars of Vishnu (q.v.), who has descended for the good of the earth, are the most famous in Hindu mythology.

**AVATCHA,** ȧ-vä'chȧ. A bay on the southeast coast of Kamchatka in lat. 52° N., affording the best harbor on the coast. Its shore line is 30 miles long. The Avatcha River flows into it, and the town of Petropavlovsk stands on it.

**AVATCHA.** A volcano, with two craters, on the Kamtchatka Peninsula, in lat. 53° 18′ N. and long. 158° 47′ E. (Map: Asia, P 3). In many respects it resembles Vesuvius. Its larger crater is several hundred yards in circumference, its height is estimated at from 8360 feet to 10,840 feet, and its most violent recorded eruptions occurred in 1827, 1837, and 1855.

**AVEBURY,** FIRST BARON. See LUBBOCK, SIR JOHN.

**AVEBURY,** ă'bĕr-ĭ, or **ABURY.** A small village in Wiltshire, England, 25 miles north of Salisbury and 6 miles west by north of Marlborough. It is the site of megalithic structures of ancient date. An earthen rampart 40 feet in height originally inclosed a circle about 1100 feet in diameter, outlined by stones averaging 16 feet in height. Within the large circle were two smaller double circles, with monuments at the centre. An avenue of similar stones led from the outer ring in a southeasterly direction to Silbury Hill, the largest artificial hill in Europe, supposed to be a British barrow. Avebury Circle is popularly conjectured to be the remnant of a Druid temple, but its real date or character has not been ascertained. It gives its name to the title of the scientist, Sir John Lubbock (Lord Avebury). Pop., 1911, 636.

**AVEIRO,** ȧ-vĕ'ē-rōō. A seaport and seat of a bishopric in Portugal, in the province of Beira, 31 miles northwest of Coimbra (Map: Portugal, A 2). It is situated at the mouth of the Vouga, on the Rio d'Aveiro, a salt lake or lagoon, extending 5 leagues to the north, is separated from the sea by a narrow bar of sand, and is intersected by numerous canals. It has a brisk export trade in salt, oil, wine, fish, timber, glass, and oranges. Kaolin and quicksilver are mined. Pop., 1911, 11,523.

**AVÉ-LALLEMANT,** ȧ'vȧ' lȧl'mäN', FRIEDRICH CHRISTIAN BENEDICT (1809–92). A German criminologist. He was born in Lübeck, studied at Jena, became advocate at Lübeck in 1834, and was a police magistrate in that city from 1851 to 1868. His chief work is *Das deutsche Gaunertum* (4 vols., Leipzig, 1858–62), a study of the history of crime in Germany, with interesting researches into the dia-

lect of criminals. Among his other works are *Die Krisis der deutschen Polizei* (Leipzig, 1861) and *Die Reform der Polizei in Hamburg* (Hamburg, 1862). He also wrote a series of detective stories.

**AVÉ-LALLEMANT,** ROBERT CHRISTIAN BERTHOLD (1812–84). A German physician and traveler, brother of Friedrich Christian Benedict Avé-Lallemant. He practiced medicine for many years at Rio de Janeiro. His principal works are *Reise durch Südbrasilien* (2 vols., 1859); *Reise durch Nordbrasilien* (2 vols., 1860); *Fata Morgana* (1872), and *Wanderungen durch die Pflanzenwelt der Tropen* (1880).

**AVELLANEDA,** ä-vā'lyä-nā'thä, ALONZO FERNANDEZ DE. The pseudonym of the author of a spurious second part of *Don Quixote*, published a year before Cervantes's own sequel appeared. The real name of this writer is not definitely known, but his work has been ascribed to 9 or 10 different writers. The appearance of this second part is supposed to have impelled Cervantes to greater industry in completing Don Quixote. See CERVANTES.

**AVELLANEDA Y ARTEAGA,** GERTRUDIS GÓMEZ DE. See GÓMEZ DE AVELLANEDA Y ARTEAGA, GERTRUDIS.

**AVELLANUS,** ARCADIUS. See MOGYOROSSY.

**AVELLINO,** ä'vĕl-lē'nō. An episcopal city, and the capital of the province of Avellino, south Italy, on the southern Naples-Benevento Railway, 18 miles south of Benevento (Map: Italy, J 7). The ruins of the ancient Abellinum are nearly 3 miles distant. Near by is the famous convent of Monte Vergine, founded in 1119, on the ruins of a temple of Cybele, and visited every year by tens of thousands of pilgrims, many of whom ascend the mountain barefoot and crawl on their hands and knees from the church door to the altar. Avellino has a market place containing beautiful obelisks, an academy, and a theatre. It has numerous mills and shoe factories and manufactures cloth, hats, and chairs. The country has been famous for chestnuts and hazel nuts since Pliny's time. Pop. (commune), 1881, 20,000; 1901, 23,760; 1911, 23,926.

**AVELLINO,** ä'vĕl-lē'nō, FRANCESCO MARIA (1788–1850). An Italian archæologist, born at Naples. He was educated at Rome, and was professor of Greek literature at the university of his native city, and private tutor of the children of Murat (1809–15). In 1820 he was appointed to the chair of political economy at the University of Naples and afterward to that of institutions and codes. Besides his catalogue of the valuable collection of coins in the Museo Borbonico (1820), of which institute he became director in 1839, he published a large number of writings under the title of *Opuscoli diversi* (1826). He founded the *Bolletino Archeologico Napolitano.*

**AVE MARIA,** ä'vä mä-rē'ä (Lat. hail Mary, from *avere*, to be well, fare well), also ANGELIC SALUTATION. A form of address to the Virgin Mary, expressing honor to her and requesting her intercession; among Roman Catholics in universal and frequent use, generally coupled with the recitation of the Lord's Prayer. The first part, "Hail [Mary], full of grace, the Lord is with thee," is the salutation of the Archangel Gabriel (Luke i. 28) to Mary; the second the address to her of her cousin Elizabeth (verse 42), "Blessed art thou among women, and blessed is the fruit of thy womb"; the prayer which forms the third part, "Holy Mary, mother of God, pray for us sinners now and in the hour of our death," was added in substance in the fifteenth century. The form at present in use appears first c.1514, and probably comes from Italy. The daily use of the whole prayer was ordered by Pope Pius V in 1568. See ROSARY.

**AVEMPACE,** ä'vām-pä'thā (ABU BEKR MOHAMMED IBN JAHYA, surnamed Ibn Sayigg and Ibn Bajja, which was later given by the scholastics as Avempace). An Arabic philosopher, physician, and poet. He was born in Saragossa toward the end of the eleventh century, and died at Fez in 1138 as a result of poison administered by an envious physician, Abu'l 'Ala ibn Zuhr. At Saragossa he held a high official place, but his philosophical and religious opinions lost him his position. In 1119 we find him in Seville, where he composed his works on logic. From there he traveled to Granada, and then to Fez, where he gained the favor of the Almoravide court. The importance of Avempace lies in the fact that he introduced the Peripatetic philosophy into Andalusia. Besides commentaries on the works of Aristotle, Avempace composed a work mentioned by Averroës, *Fi tadbir al-mutawahhid* ('Conduct of the Individual'), in which he points out methods necessary for the perfection of the individual who lives surrounded by so many hindrances to development. By speculation and intellectual effort, and not by mysticism, as Ghazali taught, man is enabled to reach the divine intellect, of which Avempace teaches the individual intellect is a part. He is said to have rejected the Koran and denied immortality. He wrote works also on medicine and music and composed poems. Consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899), vol. i, p. 460.

**AVE'NA.** See OAT.

**AVENARIUS,** *Ger pron.* ä'fe-nä'rē-ŭs, FERDINAND (1856–1923). A German æsthetic philosopher, art critic, and lyric poet, nephew of Richard Wagner, born at Berlin and educated at the universities of Leipzig and Zurich. He devoted himself to the philosophy of art, and in 1887 became the founder of the *Kunstwart*, an art journal of reformatory tendencies, which publication, after many reverses and antagonisms, became the foremost organ of its class. He is the editor of a popular and extensive collection of art reproductions. The poetic works of Avenarius are the idyl *Die Kinder von Wohldorf* (1886; 6th ed., 1910); *Lebe!* (1897, 8th ed., 1909); and the collections entitled *Stimmen und Bilder* (1897; 7th ed., 1910) and *Hausbuch deutscher Lyrik* (10th ed., 1910). His critical works comprise the anthology, *Deutsche Lyrik der Gegenwart* (2d ed., 1884) and *Max Klinger's Griffelkunst* (2d ed., 1907); *Balladen Buch* (1907, 1910); *Das fröhliche Buch aus deutscher Dichter und maler Kunst gesammelt* (1910). For criticism, consult G. Heine, *Ferdinand Avenarius als Dichter* (Leipzig, 1904).

**AVE'NA'RIUS,** RICHARD (1843–96). A German philosophical writer. He was born in Paris and studied philosophy at the universities of Zürich, Berlin, and Leipzig. From 1877 until his death he filled the chair of philosophy at Zürich and acted as co-editor of the *Vierteljahrsschrift für wissenschaftliche Philosophie.* His principal original contribution to philosophy was a theory of experience, which is embodied in

his *Kritik der reinen Erfahrung* (2 vols., Leipzig, 1889, 1907). He also wrote on Spinoza's pantheism and on other philosophical subjects. Consult O. Ewald, *Richard Avenarius als Begrunder des Empriokritizismus* (Berlin, 1905), and W. T. Bush, *Avenarius and the Standpoint of Pure Experience* (New York, 1905).

**AVENBRUGGER**, ä'fen-brŭg'ẽr. See AUENBRUGGER.

**AVENCHES**, å'vänsh'. A village in the canton of Vaud, Switzerland, 7 miles northwest of Freiburg, and 1½ miles south of Lake Morat, on the ancient shore of which it was located (Map: Switzerland, B 2). It is interesting as the Roman Aventicum, the capital of the Helvetii, and its remains include those of an amphitheatre, walls, and a Corinthian column (39 feet high) of a temple of Apollo. This column, celebrated by Byron in *Childe Harold* (3d canto, 65th line), is known as Le Cicognier, from the fact that for centuries storks have used it as a nesting place. Avenches is the German Wiflisburg (castle of Wiflis, a Count of Burgundy of the seventh century). The castle is built on the site of the Roman Capitol, and there is a museum in the amphitheatre. During the Roman period Avenches had 60,000 inhabitants. Pop., 1910, 1802.

**AV'ENEL**, JULIAN. A character in Scott's novel, *The Monastery*, who has seized Avenel Castle at the opening of the story. He is the uncle of Mary Avenel.

**AVENEL**, MARY. The daughter of Lady Avenel and, ultimately, the wife of Halbert Glendinning, in Sir Walter Scott's novels, *The Monastery* and *The Abbot*.

**AVEN'GER OF BLOOD.** In primitive society the person, usually the next of kin of the murdered man, charged with the duty of avenging the crime of murder by slaying the murderer. The legal recognition of this duty and its regulation by law are really the beginnings of a system of criminal law. The crimes with which primitive law concerns itself are crimes of violence—man-killing, wounding, and robbery. Their punishment, however, is not, as with us, a matter for the state, but is left to the injured person or to his kinsman. This legalized right of private vengeance, called the blood feud (see BLOOD FEUD), was, in course of time, mitigated by the doctrine of sanctuary (q.v.), which held the vengeance of blood in abeyance until passions had time to cool and the justification of the deed could be made to appear (see ASYLUM); and by the institution of the wergild (q.v.), whereby the wrongdoer was permitted to commute the natural penalty of his crime for a money payment. This wergild went to the avenger of blood, and the barbarous codes of the early Middle Ages contain elaborate provisions for determining the amounts to be paid and the persons entitled, as avengers of blood, to share in the payment.

The Mosaic law (Num. xxxv.) recognized this institution of primitive society, but placed it under regulations, prohibiting the commutation of the penalty of death for money, and appointing "cities of refuge" for the manslayer who was not really a murderer. (See CITY OF REFUGE.) The Koran sanctions the avenging of blood by the nearest kinsman, but also sanctions the pecuniary commutation for murder. The primitive custom subsists in full force among the Arabs at this day. The hereditary feuds of families, clans, and tribes in barbarous and semi-barbarous countries are survivals of this institution.

**AVE'NIO.** A Roman town in Gallia Narbonensis, now Avignon.

**A'VENS.** See GEUM.

**AV'ENTINE.** The southernmost of the hills of Rome, east of the Tiber. It was included in the city by Servius Tullius, and settled by the plebs in 455 B.C. Of many temples and edifices no traces remain. (See ROME.) Consult Platner, *Topography and Monuments of Ancient Rome* (New York, 1911).

**AV'ENTI'NUS**, JOHANNES (1477–1534). A German historian, born at Abensberg, Bavaria. His real name was Turmair. He studied at Ingolstadt and at Paris, and taught Greek and mathematics at Cracow and poetry and forensics at Vienna. In 1509 the Duke of Bavaria called him to Munich and intrusted him with the education of his sons. Here he wrote his valuable history of Bavaria (*Annales Boiorum*), which occupied him 16 years. This work was not published until 20 years after his death, and then only with large portions adverse to the Roman Church excised. These, however, were all restored in Cisner's edition (1580). Among his other works are *Chronicon sive Annales Schirenses* (1600) and *Vita Henrici IV* (1518). Consult Döllinger, *Aventinus und seine Zeit* (Munich, 1877).

**AVENTURINE**, å-vĕn'tū-rĭn (from It. *avventurino*, from *avventura*, adventure, chance; refers to its accidental discovery). A transparent to opaque variety of quartz, either red, yellow, or brown, with iridescent spangles of mica, hematite, or other minerals scattered through it. The specimens found at Cape de Gata in Spain have been cut and used as gems; also those found at Glen Fernat in Scotland. A few localities have been reported in the United States. The name "aventurine" is also given to certain varieties of feldspar, as orthoclase and oligoclase, which have the property of reflecting light in various colors from points inside the mineral. The best specimens are from Swedestrand, Norway, and excellent varieties have been found in Statesville, N. C. These are cut and sold as gems, under the name of sunstones. A similar effect was produced by the Venetian glass makers, who are said to have discovered the method of artificially producing this effect by accidentally dropping brass filings into melted glass.

**AVENZOAR**, ä'vĕn-zō'är (ABU'L MARWAN ABD AL MALIK IBN ZUHR) (c.1072–1162). An eminent Spanish-Arabian physician, born at Seville. A close student of such medical works as had been translated from Greek into Aramaic and Arabic, and especially a great admirer of Galen, Ibn Zuhr insisted upon the importance of the experimental method. His remarkable knowledge of anatomy and his careful diagnosis of disease in himself as well as in others led him to propose and to try many experiments. He prescribed the introduction of food into the stomach by a silver tube, and suggested in cases of obstruction tepid baths of nutritive liquids taken by cutaneous imbibation. Ibn Zuhr influenced by his scientific method the great philosopher Averroes (q.v.), who, according to Leo Africanus, attended some of his lectures. A book of his on *The Method of Preparing Medicines and Diet* was translated first into Hebrew (1280) and then into Latin (1490).

**AV'ERAGE** (OF., Low Lat. *averagium*, pos-

sibly from OF. *aver*, property, cattle; literally, to have, Lat. *habere*). A medium; any medial amount obtained by comparison of a number of specific cases; e.g., three persons have the respective ages 20 years, 30 years, 50 years; their average is ⅓ (20 + 30 + 50) years, or 33⅓ years. The average of two quantities is called their arithmetic mean. (See MEAN.) The process of averaging is of importance in the comparison of statistics, as the average yield of staple products per acre or per year for a period of years, the average monthly shipment of gold to foreign countries, the yearly average of emigration, or the average monthly rainfall. In the case of physical measurements the items are not generally of equal accuracy. Hence the items are given different weights, the process of averaging becoming more complicated, and the method of least squares (see LEAST SQUARES, METHOD OF) is commonly employed.

**AVERAGE**, IN MARITIME LAW. The generic sense of this term in maritime law appears to be: the loss of property while embarked upon a maritime adventure. *Particular average* denotes a loss which is borne by the party whose property is injured or destroyed and towards which others are not bound to contribute. Examples of this are: Carrying away of masts by storm; accidental stranding or collision of the vessel; capture of the ship or cargo by an enemy. *Petty average*, or *customary average*, is applied to certain expenditures, such as pilotage, anchorage, and towage charges in port, which were formerly apportioned among the owners of ship and cargo, but which are now generally provided for in bills of lading.

*General average* was defined by the International Congress at Brussels in 1888 as follows: "An extraordinary expenditure, or a sacrifice voluntarily made by the captain or pursuant to his orders, for the common good and safety of the ship and cargo." For the adjustment of general-average losses, a body of regulations was adopted by the Association for the Reform and Codification of the Law of Nations, at Antwerp, in 1877, and amended by the Association at Liverpool in 1890. It is known as the York-Antwerp Rules, and is often agreed upon by parties to shipping articles as the measure of their duties and liabilities. In the observance of such an agreement these rules have no binding force upon litigants and are of value only as a careful statement of the views of experts. The law of general average is a part of the maritime law, or law of the sea, as distinguished from the municipal law, or law of the land. It was introduced into English jurisprudence from the Roman law, which, in turn, had adopted its principles from the laws of Rhodes. A person's right to general-average contribution does not depend upon an express contract, although it may be modified by agreement. It rests upon mercantile custom; but a custom so definite and so well understood that every mercantile adventure is entered upon with the actual or presumed knowledge on the part of all interested that the right accompanies, and forms a part of, the transaction. Accordingly some eminent judges have declared that the right now arises from an implied contract.

In order to constitute a case of general average, three things must concur, viz.: 1. "A common danger; i.e., a danger in which ship, cargo, and crew all participate; a danger imminent and apparently inevitable, except by voluntarily incurring the loss of a portion of the whole to save the remainder. 2. There must be a voluntary jettison, or casting away of some portion of the joint concern, for the purpose of avoiding this imminent peril; or, in other words, a transfer of the peril from the whole to a particular portion of the whole. 3. This attempt to avoid the imminent peril must be successful." It will be noticed that this statement of the principles by the United States Supreme Court is not broad enough to include every case where one's property is destroyed for the purpose of saving the property of another. The sole object of the sacrifice must be that of saving a ship, its cargo, and crew from a common peril. If the ship or its cargo is sacrificed to save another ship, or other property not included in the common adventure, it is not a case of general average. Again, if the loss is involuntary, it is not the subject of general average. For example, if a ship is attacked by pirates or by an enemy, anything voluntarily sacrificed by the master of the ship in buying off or getting rid of the assailant is a general-average loss, while anything captured is not. So, if a vessel lying at its dock, or its cargo, is injured or destroyed by local authorities, as incidental to the extinguishment of a fire or the preservation of outside property, it is not a case of general average; but it is such a case if the injury or destruction is authorized by the master, and, therefore, is voluntary. When it is said that the attempt to avoid the peril must be successful, all that is meant is that some portion of the common adventure must be saved from the peril. It is not necessary that the voyage be accomplished, or even that the property saved from the first peril be brought to its destination; its destruction from a second and distinct peril does not affect the general average arising from the first.

There are two exceptions to the rule that sacrifices or expenditures made for the preservation of the whole adventure are made good to the owner of the injured interest by contribution levied on the whole adventure: First, when the loss is due to the fault of the injured owner. Second, when the injured or sacrificed goods were carried on deck; unless such deck cargo was permitted either by the established custom of navigation or by the assent of the owners of the general cargo. The second exception rests upon the general rule of maritime law that the deck of a ship is an improper place for cargo, as its stowage there interferes with the safe navigation of the vessel.

In the absence of a special agreement to the contrary, all the imperiled property saved must contribute to make good the loss of that which was voluntarily sacrificed by the master, or common agent of all. The owner of the sacrificed interest is not reimbursed for his entire loss. On the other hand, he is bound to contribute to his own loss proportionally with his co-adventurers. In other words, the owners of the saved property contribute that percentage of its value which the value of the lost property bears to the value of all that was imperiled. As a rule, the value of a saved interest upon which it must pay contribution is the same as the value upon which it would have received contribution had it been sacrificed. In the case of the ship, this is her fair value to her owners at the time and place of adjustment; in the case of freight, its net value at that time; in the case of cargo,

narket value of the goods at the end of the ge, less charges for freight, duties, and the

While the ordinary place for adjusting ·al-average contributions is the port where ·oyage was to end, the adjustment may be elsewhere, either upon the assent of all es interested, or by reason of necessity as se of a disaster which prevents the comple- of the voyage. When made in accordance the law of the proper place, the adjust- is binding everywhere.

ıile the rules relating to general average established many centuries before insur- was practiced, they are associated quite ly now with marine insurance. See MARINE RANCE, and consult the authorities referred ıder INSURANCE.

**VERELL,** WILLIAM WOODS (1832–1900). merican soldier, famous as a cavalry leader g the Civil War. He was born in Cameron, .; graduated at West Point in 1855; and 1857 to 1859 was engaged in frontier duty st the Indians. During the Civil War he part, as first lieutenant in a cavalry regi- in the first battle of Bull Run; and as el of volunteers in the Peninsular cam- ; was raised to the rank of brigadier- al of volunteers in September, 1862; and ırch, 1863, began the series of cavalry raids hich he became famous. On these raids, in ·64, he fought numerous battles and skir- ıs, destroyed many miles of railroad, cap- large quantities of supplies, and did much ıconcert the Confederates and assist Federal ıanders in carrying out their plans of cam- . In March, 1865, he was brevetted briga- ·eneral, for "gallant and meritorious ser- during the war, and major-general for ıtry in the battle of Moorfield, Va., and in resigned from the service. From 1866 to he was United States Consul General to ıh North America. He then became presi- of a large manufacturing company, and ıg. 17, 1888, was reappointed captain in the d States army; but retired on the 31st of ıme month. He invented a form of asphalt ıent now in general use, the Averell in- ng conduits for wires and conductors, and thod for manufacturing cast steel direct the iron ore in one operation.

**ER/NUS** (Lat., Gk. *Ἄορνος, Aornos,* usu- erived from *ἀ, a,* priv. + *ὄρνις, ornis,* bird), LAGO D'AVERNO. A small, nearly circular n Campania, Italy, situated between Cumæ, li, and Baiæ. It is about a mile and a half cumference and occupies the crater of an ·t volcano. The sulphurous and mephitic s arising from the lake were believed in ıt times to kill the birds that flew over it. r to its gloomy aspect, it became the of many ancient fables of the world of s. Here was situated Homer's Nekyia, or ıce to the underworld; here the Cim- ns are said to have dwelt—a people who in deep caverns, without ever coming into ght of day, and imparted oracles learned ·h the earth; here also were placed the of Hecate and the grotto of the Cumæan

Agrippa caused the dense woods to be ıd, by which the place lost most of its ·ss; he transformed the lake into a naval uarters, known as the Portus Iulius, which ınected by a canal with the Lacus Lucrinus. is orders, too, Cocceius constructed the s tunnel through the mountain to Cumæ. The lake was also connected in ancient times with the Gulf of Baiæ.

**AVERROËS,** ȧ-vĕr'ō-ēz (ABU 'L WALID MOHAMMED IBN AHMED IBN ROSHD) (c.1126–98). A famous Spanish-Arabian philosopher and jurist, born at Cordova. His father and grandfather had been great jurists. At Cordova he studied theology and philosophy under Tofail and medicine under Ibn Zuhr. By Ibn Tofail he was introduced to Abu Yakub Yusuf, the Caliph of Morocco. Averroès, however, did not stay long in Morocco. In 1169 he was appointed judge in Seville, and then at his native town, Cordova. In 1182 he was appointed physician to the Caliph of Morocco, but again he left to take a judgeship in Cordova. Being accused of doctrines contrary to orthodox Mohammedanism, he was deprived of his office and exiled to Lucena, where he lived in great poverty. Again he was called to Morocco, where he died. He had several sons, one of whom expounded his father's theory of the intellect. Averroès regarded Aristotle as the greatest of all the philosophers; his commentaries on the works of Aristotle (extant in Hebrew and Latin translations) exerted a great influence on the scholastic school in Europe. He opposed the orthodox school, and insisted that the Koran must be explained in the light of reason and not along mystical lines, as had been done by Ghazali (q.v.). The latter's work, *The Destruction of Philosophy,* was answered by Averroès in *The Destruction of the Destruction,* which was translated into Latin by Locatellus (1497–1529). Works of his criticising the positions of Avicenna and Farobi are extant in manuscript. In medicine Averroës sided with Aristotle as against Galen; his medical work, *Colliget,* appeared in Latin (Venice, 1482, 1514). His complete works were published in 1552 at Venice. For more extended bibliography, consult Renan, *Averroès et l'averroïsme* (Paris, 1852, 2d ed., 1860); Brockelmann, *Geschichte der arabischen Litteratur,* vol. i, p. 461 (Weimar, 1899); De Boor, *History of Philosophy in Islam* (Leyden, 1903).

**AVERSA,** ȧ-vĕr'sȧ. An episcopal city in the province of Caserta, south Italy, 12 miles north of Naples (Map: Italy, J 7). It has a cathedral and monasteries, a famous insane asylum, and an excellent asylum for foundlings. It is famous for *asprino,* a sparkling white wine, and for oil, silk, and fruit. It is near the site of the ancient Atella, whence came the *Atellanæ fabulæ,* coarse farces that in time developed into comedy. The new town was founded in 1029 by the Normans. Pop. (commune), 1881, 21,000; 1901, 23,477; 1911, 23,203.

**AVERULINO,** ȧ-vā'rōō-lē'nō, ANTONIO. See FILARETE.

**A'VERY,** ELROY MCKENDREE (1844– ). An American author, born at Erie, Mich. He fought in the Civil War and retired with the rank of sergeant-major, graduated at the University of Michigan in 1871, taught in various Ohio schools, and from 1893 to 1897 was a member of the State Senate. Among his many publications are elementary text-books in physics and chemistry, which, in various editions, have been much used in the public schools throughout the United States. He also wrote *Words Correctly Spoken* (1887), *The Town Meeting* (1904), *Elementary Physics* (1906), and *The Groton-Avery Clan* (1911). In 1910 he had published seven of 15 volumes under the title *A History of the United States and its*

*People.* A monograph on *John Humphrey, Massachusetts Magistrate,* appeared in 1912.

**AVERY,** SAMUEL (1865– ). An American chemist and educator, born at Lamoille, Ill., and educated at Doane College, the University of Nebraska, and Heidelberg. After 1896, with the exception of three years as professor at the Agricultural Experiment Station of the University of Idaho, he served continuously on the faculty of the University of Nebraska until 1908. At that time, when head professor of chemistry, he was appointed acting chancellor, and in the following year was made chancellor. He became known as a popular lecturer on educational subjects, and, besides preparing numerous bulletins of interest to chemists, wrote jointly with H. H. Nicholson *Exercises in Chemistry* (1899).

**AVERY,** SAMUEL PUTNAM (1822–1904). An American connoisseur and dealer in art. He was born in New York City, where he studied engraving and was extensively employed by leading publishers. He began business as a dealer in art in 1865. In 1867 Mr. Avery was appointed commissioner in charge of the American art department of the Exposition Universelle in Paris. He was a founder, and for long a trustee, of the Metropolitan Museum of Art and was a life member of important scientific, artistic, and educational associations. He founded the Avery Architectural Library at Columbia University in memory of his son, Henry Ogden Avery, an architect of note, who died in 1890. In 1912 Avery Hall, in memory of father and son, was erected on the Columbia campus. Its first floor houses the Avery Library, now rated the richest collection in the country of works on architecture and the allied arts. See COLUMBIA UNIVERSITY.

**AVERYSBORO,** ā′vēr-ĭz-bûr′ō. A village in Harnett Co., N. C., about 20 miles northeast of Fayetteville. Here, on March 16, 1865, during the Civil War, a Confederate force under Hardee made a stand against Slocum's wing of Sherman's advancing army, but was quickly driven back and during the night retreated upon Smithfield. The Union loss was 77 killed and 477 wounded; the Confederate about 700, including over 200 prisoners.

**AVES,** ā′vēz (Lat., pl. of *avis,* bird). A class of the phylum Chordata, the birds most distinctly characterized by their exclusive possession of feathers as a covering and by their structural adaptations to flight. See BIRD.

**AVES,** LOS, lōs ä′vās, or **BIRD ISLANDS.** A group of small islands off the north coast of Venezuela, South America, belonging to that republic. They lie east of the Dutch island Buen Ayre and have guano deposits.

**AVESNES,** ä′vān′. The capital of an arrondissement in the department of Nord, France, on the Helpe, 50 miles southeast of Lille (Map: France, N., J 2). The church of St. Nicholas is a fine building dating from the thirteenth century. Also noteworthy are the Communal College, a public library, and museum. Manufactures of woolens and hosiery are the chief industries. Avesnes was prominent as a centre of conflict during the fifteenth century and was fortified during the reign of Louis XIV according to the system of Vauban. It was bombarded after the battle of Waterloo and for some time was occupied by the allied troops. Pop., 1901, 6217; 1906, 6013; 1911, 5829.

**AVES'TA,** or **ZEND'-AVES'TA.** The name under which, as a designation, are comprised the bible and prayer-book of the Zoroastrian religion. The Avesta forms to-day the sacred books of the Parsis, or Fire Worshipers, as they are often termed, a small community living now in India or still scattered here and there in Persia. The original home of these worshipers and of their holy scriptures was ancient Iran, and the faith they profess was that founded many centuries ago by Zoroaster (q.v.), one of the great religious teachers of the East.

The Avesta is therefore an important work, as it preserves the doctrines of this ancient belief and the customs of the earliest days of Persia. It represents the oldest faith of Iran, just as the Vedas do of India. It stands as the law of ancient Media, and later of Persia, and apparently also of Bactria. The religion which the Avesta presents was once one of the greatest, and it has left ineffaceable traces upon the history of the world. It flourished fully six centuries before the Christian Era; it certainly became the religion of the later Achæmenian kings, if it was not already the creed of Cyrus, Darius, and Xerxes; but its power was weakened by the conquest of Alexander, and many of its sacred books were lost. It revived again during the first centuries of our own era, but was finally broken by the Mohammedans in their victorious invasion. Most of the Zoroastrian worshipers were then compelled, through persecution, to accept the religion of the Koran; many, however, fled to India for refuge and took with them what was left of their sacred writings. A few of the faithful remained behind in Persia and, though persecuted, they continued to practice their religion. It is these two scanty peoples—perhaps 80,000 souls in India and 10,000 in Persia—that have preserved to us the Avesta in the form in which we now have it.

The designation *Avesta,* for the scriptures, is adopted from the term *Avistāk,* regularly employed in the Pahlavi (q.v.) of the Sassanian time. But it is quite uncertain what the exact meaning and derivation of this word may be. Possibly Phl. *Avistāk,* like the Skr. *Veda,* signifies 'wisdom, knowledge, the book of knowledge.' It may, however, mean 'the law.' The designation *Zend-Avesta,* though made current by Anquetil-Duperron, as described below, is not an accurate title. It arose by mistake from an inversion of the oft-recurring Pahlavi phrase, *Avistāk va Zand,* 'Avesta and Zend,' or 'the Law and Commentary.' The term *Zand* in Pahlavi (cf. Av. *āzaiñti*), as the Parsi priests now rightly comprehend it, properly denotes 'understanding, explanation,' as opposed to the *Avesta* itself, which some maintain signifies 'the unknown' text that needed explanation in order to be understood. It is certain that *Zand* is the name of the later version and commentary of the Avesta texts, the paraphrase which is written in the Pahlavi language. The proper designation for the scriptures, therefore, is *Avesta;* the term *Zend* should be understood as the Pahlavi version and commentary. It is noteworthy that the Greeks never mention the Zoroastrian writings in discussing the Persian faith, while Arabic authors frequently allude to the "Avesta."

**Discovery and History of Research of the Avesta.**—Of the religion, manners, and customs of ancient Persia which the Avesta preserves to us, we had but meagre knowledge until about

a century ago. What we did know up to that time was gathered from the more or less scattered and unsatisfactory references of the classic Greek and Latin, from some allusions in Oriental writers, or from the later Persian epic literature. To direct sources, however, we could not turn. Allusions to the religion of the Magi, the faith of the Avesta, are to be found in the Bible. The Wise Men from the East who came to worship the Saviour, the babe in Bethlehem, were Magi. Centuries before that date, however, it was Cyrus, the ancient Persian King, whom God called his anointed and his shepherd (Isa. xlv. 1, 13; xliv. 28; 2 Chron. xxxvi. 22, 23; Ezra i. 1–11), and who gave orders that the Jews be returned to Jerusalem from captivity in Babylon. Darius, moreover (Ezra v. 13–17; vi. 1–16), the worshiper of Ormazd, favored the rebuilding of the Temple at Jerusalem, as decreed by Cyrus. Allusions to the ancient faith of the Persians are perhaps contained in Ezek. viii. 16; Isa. xiv. 7, 12. The classical references of Greek and Roman writers to the teachings of Zoroaster, which we can now study in the Avesta itself, may be said to begin with the account of the Persian religion given by Herodotus (450 B.C.). To this account may be added references and allusions, though often preserved only in fragments by various other writers, including Plutarch, "On Isis and Osiris," and Pliny down to Agathias, about 560 A.D. The Armenian writers, Eznik and Elisæus, of the fifth century A.D., also refer to the Zoroastrian religion. After the Mohammedan conquest of Persia we have an allusion by the Arabic writer, Masudi (940 A.D.), who tells of the *Avesta* of Zeradusht (Zoroaster), and its commentary called *Zend*, together with a *Pazend* explanation. The *Abasta* (Avesta) is also mentioned several times by Al-Biruni (about 1000 A.D.). The later Mohammedan author, Shahrastani (1150 A.D.), sketches in outline the creed of the Magi of his day. An interesting reference is found in the Syriac-Arabic Lexicon of Bar-Bahlul (963 A.D.) to an *Avastak*, a book of Zardosht (Zoroaster), as composed in seven tongues—Syriac, Persian, Aramæan, Segestanian, Marvian, Greek, and Hebrew. In an earlier Syriac MS. Commentary on the New Testament (852 A.D.) by 'Isho'dad, Bishop of Hadatha, near Mosul, mention is made of the Abhāstā as having been written by Zardosht in 12 different languages. These latter allusions, though late, are all of them important, as showing the continuity during ages of the tradition of such a work as the Avesta, which contains the teachings of Zoroaster, the Prophet of Iran. All these allusions, however, it must be remembered, are by foreigners. No direct Iranian sources had been accessible.

From this time, moreover, till about the seventeenth century, we find there was little inquiry into the sacred books of the Persians. One of the first series of investigations into the Greek and Roman sources seems then to have been undertaken by a European, Barnabé Brisson, *De Persarum Principatu* (Paris, 1590). The Italian, English, and French travelers in the Orient next added some information as to the religion and customs of the Persians. Among them may be mentioned the works of Pietro della Valle (1620), Henry Lord (1630), Mandelslo (1658), Tavernier (1678), Chardin (1721), Du Chinon. Most important, however, was the work of the distinguished Oxford scholar, Thomas Hyde (1700). It was written in Latin and entitled *Historia Religionis Veterum Persarum*. Hyde resorted chiefly to the later Parsi sources; the original texts he could not use, although an Avesta MS. of the Yasna seems to have been brought to Canterbury as early as 1633. Hyde appealed earnestly, however, to scholars to procure MSS. of the sacred books of the Parsis and aroused much interest in the subject. In 1723 a copy of the Vendīdād Sādah was procured by an Englishman, George Boucher, from the Parsis in Surat, and deposited as a curiosity in the Bodleian Library at Oxford. No one, however, could read the texts. To a young Frenchman, Anquetil-Duperron, belongs the honor of first deciphering them. The history of his labors is interesting and instructive. Happening, in 1744, to see some tracings made from the Oxford MS. and sent to Paris as a specimen, Anquetil-Duperron at once conceived the spirited idea of going to Persia or India and obtaining from the priests themselves the knowledge of their sacred books. Though fired with zeal and enthusiasm, he had no means or aid to carry out his plan. He seized upon the idea of enlisting as a soldier in the troops that were to start for India, and in November, 1754, behind the martial drum and fife, this youthful scholar marched out of Paris. The French government, however, recognizing at once his noble purpose, gave him his discharge from the army and presented him his passage to India. After countless difficulties he reached Surat, and there, in spite of almost insurmountable obstacles, he succeeded in winning the confidence and favor of the priests, with whom he was able to communicate after he had learned the modern Persian. He gradually induced the priests to impart to him the language of their sacred works, to let him take some of the manuscripts, and even to initiate him into some of the rites and ceremonies of their religion. He stayed among the people for seven years, and then, in 1761, he started for his home in Europe. He stopped at Oxford before going directly to Paris, and compared his MSS. with that of the Bodleian Library, in order to be assured that he had not been imposed upon. The next 10 years were devoted to work upon his MSS. and translation, and in 1771, 17 years after the time that he had first marched out of Paris, he gave forth to the world the results of his untiring labors. This was the first translation of the Avesta, or, as he called it, Zend-Avesta (*Ouvrage de Zoroastre*, 3 vols., Paris, 1771), a picture of the religion and manners contained in the sacred book of the Zoroastrians.

The ardent enthusiasm which hailed this discovery and opening to the world of a literature, religion, and philosophy of ancient times was, unfortunately, soon dampened. Some, like Kant, were disappointed at not finding the philosophical or religious ideas which they had looked for; while others missed the high literary value they had expected. They little considered how inaccurate, of necessity, such a first translation must be. Though Anquetil-Duperron had learned the language from the priests, still, people did not know that the priestly tradition itself had lost much during the ages of persecution or oblivion into which the religion had fallen. They did not take into account that Anquetil-Duperron was learning one foreign tongue, the Avesta, through another, the modern Persian; nor did they know how little accurate and scien-

tific training he had had. A discussion as to the authenticity of the work arose. It was suggested that the so-called Zend-Avesta was not the genuine work of Zoroaster, but a forgery. Foremost among the detractors was the distinguished Orientalist, Sir William Jones. He claimed, in a letter published in French (1771), that Anquetil-Duperron had been duped; that the Parsis had palmed off upon him a conglomeration of worthless fabrications and absurdities. In England Sir William Jones was supported by Richardson; in Germany he was supported by Meiners. In France the genuineness of the book was universally accepted, and in one famous German scholar, Kleuker, it found an ardent supporter. He translated Anquetil-Duperron's work into German (Riga, 1776), for the use of his countrymen, especially the theologians, and he supported the genuineness of these scriptures by classical allusions to the Magi. For nearly 50 years, however, the battle as to authenticity still raged. Anquetil-Duperron's translation, as acquired from the priests, was supposed to be a true standard to judge by; little or no work was done on the texts. The opinion that the books were a forgery was gradually, however, growing somewhat less positive. It was the advance in the study of Sanskrit that finally won the victory for the advocates of the authenticity of the sacred books. About 1825—more than 50 years after the appearance of Anquetil-Duperron's translation—the Avestan texts themselves began to be carefully studied by Sanskrit scholars. The close affinity between the two languages had already been noticed by different scholars; but in 1826 the more exact relation between the Sanskrit and the Avesta was shown by the Danish philologian, Rask, who had traveled in Persia and India, and who had brought back with him to the Copenhagen Library many valuable MSS. of the Avesta and of the Pahlavi books. Rask, in a small monograph on the age and authenticity of the Zend language (1826), proved the antiquity of the language, showed it to be distinct from Sanskrit, though closely allied to it, and made some investigation into the alphabet in which the texts were written. About the same time the Avesta was taken up by the French Sanskrit scholar, Eugène Burnouf. Knowing the relation between the Sanskrit and the Avestan, and taking up the reading of the texts scientifically, through his knowledge of Sanskrit, he found at once philological inaccuracies in Anquetil's translation. Anquetil, he saw, must often have misinterpreted his teachers; the tradition itself necessarily must often have been defective. Instead of this less trustworthy French rendering, he turned to an older Sanskrit translation of a part of the Avesta. This was made in the thirteenth century, by the Parsi Neryosangh and was based on the Pahlavi version. By means of this Sanskrit rendering and by applying his philological learning, Burnouf was able to restore sense to many passages of which Anquetil had often made nonsense, and he was thus able to throw a flood of light upon many an obscure point. The employment of Sanskrit introduced a new method. This discovery and gain of vantage ground practically settled the question of authenticity. The testimony, moreover, of the ancient Persian inscriptions deciphered about this time by Grotefend, Burnouf, Lassen, and by Sir Henry Rawlinson, showed still more by their contents and languages, so closely allied to the Avesta, that the work must be genuine. The foundation laid by Burnouf was now built upon by other scholars—Bopp, Haug, Westergaard, Spiegel, Roth, Justi, and later by De Harlez, Mills, Hübschmann, Bartholomæ, and especially Geldner and Darmesteter, in addition to some hardly less-known names, Parsis among them. These scholars, using partly the Sanskrit key for the interpretation and meaning of words, and partly the Parsi tradition contained in the Pahlavi translation, have now been able to give us a clear idea of the Avesta and its contents, so far as the books have come down to us. Upon minor points of interpretation, of course, there are, and always will be, individual differences of opinion.

**Contents, Arrangement, Extent, and Character.**—The Avesta, as we now have it, is but a small remnant of a once great literature. It has come down in a more or less fragmentary condition; not even a single manuscript contains all the texts that we now have; whatever we possess has been collected together from various codices. All that survives is commonly classed under the following divisions or books: (1) The Yasna, (2) the Vīspered, (3) the Yashts, (4) a collection of minor texts, (5) the Vendīdād, (6) Fragments. Among these divisions, not counting the Fragments, two groups are recognized. As used in the service of worship, the Vendīdād, Vīspered, and the Yasna are traditionally classed together for liturgical purposes and form the Avesta proper. In the manuscripts these three books appear in two different forms. If they are kept separate as three divisions, each part is then usually accompanied by a Pahlavi version. On the other hand, since these three books are not recited each as a whole, but the chapters of one book for liturgical purposes are mingled with another, on this account the MSS. often present them in their intermingled form, portions of one inserted with the other, and arranged exactly in the order that they are to be used in the service. In this latter case the Pahlavi translation is omitted, and the collection is called the Vendīdād Sādah, or Vendīdād pure—i.e., text without commentary. The second group, the minor prayers and the Yashts, which the MSS. often include with these, is called the *Khordah Avesta*, or 'Small Avesta.' Of the greater part of the latter there is no Pahlavi rendering. The contents and character of the several divisions may now be taken up in detail.

1. The *Yasna*, 'sacrifice, worship,' is the chief liturgical work of the sacred canon. It consists principally of ascriptions of praise and prayer, and in it are inserted the *Gāthās*, or 'hymns,' verses from the sermons of Zoroaster, which are the oldest and most sacred part of the Avesta. The Yasna (Skt. *yajña*) comprises 72 chapters, called *Hā, Hāiti*. These are the texts recited by the priests at the ritual ceremony of the Yasna (*Izashne*). The book falls into three nearly equal divisions. The first part (chap. i–xxvii) begins with an invocation of the god Ormazd and the other divinities of the religion; it gives texts for the consecration of the holy water, *zaothra*, and of the *baresma*, or 'bundle of sacred twigs,' for the preparation and dedication of the Haoma, the juice of a certain plant—the Indian Soma—which was drunk by the priests as a sacred rite, and the offering of blessed cakes, as well as a meat offering, which likewise were

partaken of by the priests. Interspersed through this portion, however, are a few chapters that deal only indirectly with the ritual; these are Ys. 12, the later Zoroastrian creed, and Ys. 19–21, catechetical portions. Then follow the *Gāthās*—literally 'psalms,' or 'songs' (chap. 28–53), metrical selections or verses containing the teachings, exhortations, and revelations of Zoroaster. The Prophet exhorts his followers to avoid the evil and choose the good, the kingdom of light rather than that of darkness. (For the theology of the Gāthās, see ZOROASTRIANISM.) These Gāthās are written in metre, and their language is more archaic than that used elsewhere in the Avesta. The Gāthās, strictly speaking, are five in number, and are arranged according to the metres; they comprise 17 hymns (Ys. 28–34, 43–46, 47–50, 51, 53), and they must have been chanted during the service. In their midst (chap. 35–42) is inserted the so-called Yasna of the Seven Chapters (*Haptanghāiti*). This is written in prose, and consists of a number of prayers and ascriptions of praise to Ahura Mazda, or Ormazd, the archangels, the souls of the righteous, the fire, and the earth. Though next in antiquity to the Gāthās and in archaic language, it represents a somewhat later and more developed form of the religion which in the Gāthās proper was just beginning. The third part (chap. 52, 54–72) of the latter Yasna (*saparō yasnō*) consists chiefly of praises and offerings of thanksgiving to different divinities.

2. The *Vīspered* consists of additions to portions of the Yasna, which it resembles in language and in form. It comprises 24 chapters (called *Karde*, literally, 'sections'), and it is about one-seventh as long as the Yasna. In the ritual the chapters of the Vīspered are inserted among those of the Yasna. It contains invocations and offerings of homage to 'all the lords' (*vīspē ratavō*); hence the name "Vīspered."

3. The *Yashts* (*yešti*, 'worship by praise') consist of 21 hymns of praise and adoration of the divinities, or angels, *Yazatas* (Izads), of the religion. The chief of these are Ardvī-Sūra, the goddess of waters (Yt. 5), the star Tishtrya (Yt. 8), the angel Mithra, the divinity of truth; the Fravashis, or departed souls of the righteous, and the genius of victory, Verethraghna, and of the Kingly Glory (Yt. 19). They are written mainly in metre, have some poetic merit, and they contain much mythological and historical matter that may be illustrated by Firdausi's later Persian epic, the *Shāh-Nāmah*.

4. The minor texts, *Nyāishes*, *Gāhs*, *Sīrozahs*, *Afrīgāns*, consist of brief prayers, praises, of blessings recited daily or on special occasions.

5. The *Vendīdād*, or 'law against the daevas, or demons' (*vīdaēva dāta*), is a priestly code of 22 chapters (*Fargard*), corresponding to the Pentateuch in our Bible. Its parts vary greatly in time and in style of composition. Much of it must be late; some of it even as late, perhaps, as the first or second century of the Christian Era; but much of the material is very old. The first chapter (Farg. I.) is a sort of Avestan Genesis, a dualistic account of creation. Chapter 2 sketches the legend of Yima, the Golden Age, and the coming of a destructive winter, an Iranian flood. Chapter 3 teaches the blessings of agriculture; chapter 4 contains legal matter —breaches of contract, assaults, punishments; chapters 5–12 relate mainly to the impurity from the dead; chapters 13–15 deal chiefly with the treatment of the dog; chapters 16, 17, and partly 18, are devoted to purification from several sorts of uncleanness. In chapter 10 is found the temptation of Zoroaster and the revelation; chapters 20–22 are chiefly of medical character. In the ritual, the chapters of the Vendīdād are inserted among the Gāthās.

6. Besides the above books, there are a number of fragments, one or two among them from the Hādhōkht Nask. There are also quotations or passages from missing Nasks; likewise glosses and glossaries. Here belong the *Nīrangistān*, *Aogemadaēca*, *Vištāsh*, *Yašt*, *Frahang-i-ōīm*, and other fragments. These are all written in the Avesta language and are parts of a once great collection. In Zoroastrian religious literature, though not written in the Avestan language, must also be included the works in Pahlavi, many of which are translations from the Avesta, or contain old matter from the original scriptures.

From the summary given, it will be seen that our present Avesta is rather a prayer book than a bible. The Vendīdād, Vīspered, and Yasna were gathered together by the priests for liturgical purposes. It was the duty of the priests to recite the whole of these sacred writings every day, in order to preserve their own purity and to perform the rites of purification or give remission of sins to others. The solemn recitation of the Vendīdād, Vīspered, and Yasna at the sacrifice might be compared with our church worship. The selections from the Vendīdād would correspond to the Pentateuch when read; the preparation, consecration, and presentation of the holy water, the Haoma juice, and the offering of the Yasna and Vīspered would answer to our communion service; the metrical parts of the Yasna would be hymns; the intoning of the Gāthās would somewhat resemble the Lesson and the Gospels, or even the sermon. In the Khordah Avesta the great Yashts might perhaps be comparable to some of the more epic parts of our Bible; but as being devoted each to some deity and preserving much of the old mythology, they really have hardly a parallel, even in the Apocrypha.

Such, in brief outline, are the contents of our books known as the Avesta to-day; but, as implied above, this is but a remnant of a literature once vastly greater. This we can judge both from internal and from historical evidence. The character of the work itself, in its present form, sufficiently shows that it is a compilation from various sources. This is further supported by the authority of history, if the Parsi tradition, going back to the time of the Sassanidæ, be trustworthy. Pliny (*Hist. Nat.*, 30, 1, 2) tells of 2,000,000 verses composed by Zoroaster. The Arab historian, Tabari, describes the writings of Zoroaster as committed to 12,000 cowhides (parchments); other Arabic references by Masudi, and Syriac allusions to an Avesta, which must have been extensive, have been noted above. The Parsi tradition on the subject is contained in the Rivāyats, and in a Pahlavi book, the *Dēnkart*. The *Dēnkart* (bk. iii) describes two complete copies of the Avesta. These each comprise 21 Nasks, or Nosks ('books'). The one deposited in the archives at Persepolis perished in the flames when Alexander burned the palace in his invasion of Iran. The other copy, it is implied, fell into the hands of the Greeks and by them was translated into the Greek language. From that time the scriptures, like the religion under the Græco-Parthian sway, lived on, partly

in scattered writings and in the memories of the priests, for nearly 500 years.

The first attempt again to collect these writings seems to have been begun under the reign of the last Arsacidæ, just preceding the Sassanian dynasty. Pahlavi tradition, preserved in a proclamation of King Khōsrū Anushirvan, or Chosroes I (531–579 A.D.), says it was under King Valkash that the collection was begun of the sacred writings, as far as they had escaped the ravages of Alexander or were preserved by oral tradition. The Sassanian dynasty (226 A.D.) next came to the throne. This house were genuine Zoroastrians and warm supporters of the faith, and they brought back the old religion and raised it to a height it had hardly reached even in its palmiest days. The first Sassanian monarchs, Artakhshīr Pāpakān (Ardashīr Bābagān, 226–241) and his son, Shāhpuhr I, or Sapor (c.241–272), eagerly continued the gathering of the religious writings, and the Avesta again became the sacred book of Iran. Under Shāhpuhr II (c.309–380) the final revision of the Avesta texts was made by Atūrpāt Mārāspend, and then the King proclaimed these as canonical, and fixed the number of the Nasks, or books.

Of these Nasks, 21 were counted, and a description of them, as noted, is found in the Rivāyats and in the Dēnkart; each received a name corresponding to one of the 21 words in the Ahuna Vairya (Honovar), the most sacred prayer of the Parsis. Three groups or classes, moreover, were recognized in subdividing these 21 books: First, the *Gāthā* or *Gāsān* group, a theological series; second, the group of the law, *Dāt;* and third, a miscellaneous class, *Hadha-Māthra*, partly metaphysical. Each of these Nasks contained both Avesta and Zend—i.e., original scripture and commentary. This tradition is too important to be idly rejected. Its contents give an idea of what may have been the original extent and scope of the books of the Avesta. The subjects said to have been treated in the 21 Nasks may practically be described, in brief, as follows: Nask 1 (22 sections), on virtue and piety; 2 (likewise 22 sections), religious observance; 3 (21 sections), the Mazdayasnian religion and its teachings; 4 (32 sections), this world and the next, the resurrection and the judgment; 5 (35 sections), astronomy; 6 (22 sections), ritual performances and the merit accruing; 7 (50 sections before Alexander, 13 then remaining), chiefly political and social in its nature; 8 (60 sections before Alexander, 12 remaining), legal; 9 (60 sections before Alexander, 15 preserved), mainly religious wisdom and advice; 11 (60 sections before Alexander, 6 preserved), religion and its practical relations to man; 12 (22 sections), physical truths and spiritual regeneration; 13 (60 sections), virtuous actions, and a sketch of Zoroaster's infancy; 14 (17 sections), on Ormazd and the Archangels; 15 (54), justice in business and in weights and measures, the path of righteousness; 16 (65 sections), on next-of-kin marriage, a tenet of the faith; 17 (64 sections), future punishments, astrology; 18 (52 sections), justice in exercising authority, on the resurrection, and on the annihilation of evil; 19, the Vīdēvdād, or Vendīdād (22 sections), on pollution and its purification; 20 (30 sections), on goodness; 21 (33 sections), praise of Ormazd and the Archangels.

During the five centuries after the ravages of Alexander much, doubtless, had been lost, much forgotten. The Parsi tradition acknowledges this itself when it says above, for example, that the seventh Nask consisted originally of 50 sections, but only 13 remained "after the accursed Iskander [Alexander]." So says the Dēnkart and so the Rivāyats. Like statements of loss are made of the eighth, ninth, tenth, eleventh Nasks. The loss in the five centuries from the invasion of Alexander till the time of the Sassanian dynasty was but small in comparison with the decay that overtook the scriptures from the Sassanian times till our day. The Mohammedan invasion and the inroads made by the Koran proved far more destructive. The persecuted people lost or neglected many portions of their sacred scriptures. Of the 21 Nasks that were recognized in Sassanian times as surviving from the original Avesta, a single Nask —the nineteenth, the Vendīdād—has come down to us in its full form. Even this shows evidence of having been patched up and pieced together. We can, furthermore, probably identify our present book of the Yasna and Vīspered with the Staot Yasht (*staota yesnya*), or Yasht (*yasnya*), as it is also called. The two fragments, Yt. 21 and 22 (as printed in Westergaard's edition) and Yt. 11, in its first form, are recognized by the MSS. as taken from the twentieth, or Hādhōkht Nask. The Nīrangistān, a Pahlavi work, contains extensive Avestan quotations, which are believed to have been taken from the Hūspāram, or seventeenth Nask. Numerous quotations in Pahlavi works contain translations from old Avestan passages. The Pahlavi work, Shāyast-lā-Shāyast, quotes briefly from no less than 13 of the lost Nasks; the Būndahishn and other Pahlavi books give translations of selections, the original Avesta text of which is lost. Grouping together all the Avesta texts, we may roughly calculate that about two-thirds of the total scriptures have disappeared since Sassanian times.

The present form of the Avesta belongs to the Sassanian period. Internal evidence shows that it is made up of parts most varied in age and character. This bears witness to the statement that during that period the texts, so far as they had survived the ravages of Alexander, and defied the corrupting influence of time, were gathered together, compiled, and edited. The character of the texts, when critically studied, shows the method that must have been adopted. According to the record of Khōsrū Anushirvan (531–579 A.D.), referred to above, King Valkash ordered that all the writings which might have survived should be searched for, and that all the priests who preserved the traditions orally should contribute their share to restoring the original Avesta. These texts, as collected, were reëdited under successive rulers, until, under Shāhpuhr II (c.309–380 A.D.), the final redaction was made. It is manifest that the editors used the old texts as far as possible; sometimes they patched up defective parts by inserting other texts; occasionally they may have added or composed passages to join these or to complete some missing portion. In this respect the textual criticism by means of metrical restoration is most instructive. Almost all the oldest portions of the texts are found to be metrical; the later, or inserted portions, are, as a rule, but not always, written in prose. The grammatical test is also useful; the youngest portions generally show a decay of clear grammatical knowledge. The metrical Gāthās in this respect are remarkably pure.

They are, of course, the oldest portion of the text, dating from Zoroaster himself, despite the view of Darmesteter, who wished to bring the date of their completion down to the first Christian century. The longer Yashts, and the metrical portions of the Yasna, contain much that is very old; in point of time these parts would probably fall but a few centuries later than the Gāthās. The Vendīdād in this respect is most incongruous. Some parts of it are doubtless of great antiquity, though corrupted in form; other parts of it, like the younger portions also of the Yashts, may be quite late. The same is true of formulaic passages throughout the whole of the Avesta, and of some of the ceremonial or ritual selections in the Vīspered and Nyāishes, etc. Roughly speaking, the chronological order of the texts would be somewhat as follows: I. Gāthās (Ys. 28–53), including (II.) the Yasna Haptanghāiti (Ys. 35–42), and some other compositions, like Ys. 12; Ys. 58 in the Gāthā dialect. III. Metrical Yasna and Yashts, Ys. 9–11; Ys. 57, 62, 65; Yt. 5, 8, 9, 10, 14, 15, 17, 19; portions of Vd. 2, 3, 4, 5, 18, 19, and scattered verses in the Vīspered and Afrīngāns, etc. In such cases it is generally, but not always, easy to discover, by style and language, where old material failed and the hand of the redactor came in with stupid or prosaic additions. Considerable portions of our present Avesta, especially the entire Gāthās, we may regard as coming directly from Zoroaster himself; still, additions from time to time must have been made to the sacred canon from his time on till the invasion of Alexander. The so-called copy of the Zoroastrian Bible, which it is claimed was destroyed by that invader, doubtless contained much that was not directly from the founder of the faith, but was composed by his apostles and later followers. The Parsis, however, generally regard the whole work as coming directly from Zoroaster; this is a claim that even the Avesta itself hardly makes. The Gāthās, however, undoubtedly came directly from the Prophet; the Avesta itself always speaks of them as "holy," and especially calls them the "five Gāthās of Zoroaster." We may fairly regard many other portions of the Avesta as direct elaborations of the great teacher's doctrines, just as the Evangelists have elaborated for us portions of the teachings of Christ.

In regard to the locality in which we are to seek the source of the Avesta and the cradle of the religion, opinions have been divided. Some scholars would place it in the west, in Media; others would still maintain that we are to look to the east of Iran, to Bactria, as its source; or again to Afghanistan or Khorassan for the home of the Avestan language. Each of these different views probably has some right on its side, and we shall perhaps not go far astray if we regard the Avesta as coming partly from the east and partly from the west. We know that a number of its scenes may be placed in the east or southeast of Iran; but other scenes are best ascribed to the west, where Zoroaster first appeared. On the question of his original home, see ZOROASTER. The language itself of the texts, as used in the church, became a religious language, precisely as did Latin, and therefore was not confined to any place or time. We may regard the Avesta as having been worked upon from Zoroaster's day down to the time of the Sassanian redaction.

**The Pahlavi Version of the Avesta.**—To the period of the Sassanian editing of the texts belongs the Pahlavi translation and interpretation of the Avesta. At the date when the texts were compiled and edited, the general knowledge of the language of the Avesta and the understanding of the sacred texts was far from perfect. The preparation of a translation or version became necessary. Accordingly, the great body of the texts was rendered into Pahlavi, the language used by Persia at the time of the Parthian Arsacidæ and the Sassanidæ. The Pahlavi version and interpretation of the Yasna, Vīspered, and Vendīdād, each entire, with some portions of the other texts, has been preserved. We have not yet so thorough an understanding of the Pahlavi version of the old texts as might be wished; but as our knowledge of this translation increases, we shall see more and more its importance. Owing to the somewhat imperfect knowledge of the Avestan texts at the time when the version was made, and owing to the unskillful and peculiar method in which the Pahlavi translation is made, it abounds in numerous errors and inaccuracies. It is often, however, of the greatest value in interpreting allusions, and particularly in giving hints for the meanings of obscure words, and in such matters is our best and only guide. When more fully understood and used in connection with the "comparative method," referring to the Sanskrit, in interpreting the sacred texts, the "traditional method" or native explanation is destined to win great results. The "traditional" and the "comparative" methods must go hand in hand.

**Manuscripts of the Avesta.**—The oldest manuscript that we possess dates from the middle of the thirteenth century. From that date onward we have a considerable number of codices still extant. They come to us from India and from Yezd and Kerman, in Persia. The Parsi priests, especially the Dasturs, Dr. Jamaspji Minocheherji, and Peshotan Behramji, and their friends have shown princely generosity in aiding western editors by putting valuable MSS. in their possession. It is thus that it was possible for the new edition of the Avesta texts, by Professor Geldner, of Berlin, to be presented in so critical a manner.

The importance of the Avesta lies not alone in the field of philology, ethnology, and early literature, but also in the investigation of comparative religion. Resemblances to Christianity in its teachings become significant when we consider the close contact between the Jews and the Persians during the Babylonian Captivity.

**Language of the Avesta.**—The language in which the Avesta is written may be best termed *Avestan*, or simply *Avesta*. The designation *Avesta* for the language, as well as the book, is in keeping with the Pahlavi *Avistāk*, which is used both of the tongue and of the scriptures. The term *Avestan*, both for the language and as an adjective, is to be in some respects preferred, in order to distinguish the speech from the work itself. The term *Zend* for the language, as noted above, is a misnomer. The designation *Old Bactrian*, sometimes used for this tongue, has little to recommend it. The language of the Avesta belongs to the Iranian group. With the ancient Persian inscriptions it makes up the Old Iranian division. The later Iranian languages, New Persian, Kurdish, Afghan, Ossetish, Baluchi, Pamir, and other dialects, complete the younger division. The intervening Pahlavi with its Pāzand, and Parsi, does not quite complete the link between the divisions. See IRANIAN LANGUAGES.

The alphabet in which the Avesta is written is far younger than the language it presents. The characters are derived from the Sassanian Pahlavi, which was used to write down the oral tradition when the texts were collected and edited under the dynasty of the Sassanidæ. The writing is read from right to left. What the original Avestan script was we do not know.

Two dialects may be recognized in the Avesta: one, the "Gāthā dialect," or the language of the oldest parts of the Gāthās; the other, "younger Avestan," or the "classical dialect." This latter is the language of the great body of the Avesta. The Gāthā dialect is more archaic, standing in the relation of the Vedic to the classical Sanskrit, or the Homeric Greek to the Attic. Possibly the Gāthā language may also owe some of its peculiarities noticed below to an original difference of locality. The Gāthā dialect was the speech of Zoroaster and his followers. Its grammatical structure is archaic and remarkably pure. The younger Avesta, in its very latest compositions, owing to decay, shows many corruptions and confusions in its inflections. All that is written in metre, however, is old and is generally correct and accurate. Inaccuracies that have crept in we must generally attribute to the carelessness of the scribes. In its forms, as a rule, the Avesta is extremely antique; in general it stands on the same plane as the Vedic Sanskrit, and occasionally, though not often, it shows even more ancient forms.

The language of the Avesta is most closely allied to the Sanskrit, though individually quite distinct from the latter. Together they may be classed as making up an old Indo-Iranian group. Almost any Sanskrit word may be changed at once into its Avestan equivalent, or vice versa, merely by applying certain phonetic laws. As an example may be taken the metrical stanza Ys. 10, 8, in the Avesta:

*yō yaθā puθrəm taurunəm*
*haomәm vandaēta mašyō*
*frā ābyō tanubyō*
*haomō vīsāite baēšazai.*

'Whosoever kindly welcomes Haoma, even as a tender stripling, to such person Haoma approaches bringing health'—becomes when rendered word for word in Sanskrit:

*yó yáthā putrám táruṇaṃ*
*sómaṃ vandēta mártyaḥ*
*prá ābhyas tanúbhyaḥ*
*sómō višatē bhēṣajāya.*

In its phonology the Avesta agrees with the Sanskrit in its vowels, but the Avesta shows a greater variety in its *e-* and *o-* sounds instead of *a*. Final vowels, except *ō*, are shortened as a rule. The Skt. diphthong *ē* appears in Av. as *aē, ōi, ē* (final); Skt. *ō* as Av. *ao, əu, ō* (final). A striking peculiarity in Av. is the introduction of epenthetic vowels and help sounds, giving rise to improper diphthongs, *bavaiti*, 'he becomes'= Skt. *bhávati;* Av. *haurva-*, 'whole'=Skt. *sárva-;* Av. *vakhədhra-*, 'word'=Skt. *vaktra-;* Av. *hvarə;* 'sun'=Skt. *svàr*. The Skt. voiceless stops, *k, t, p*, generally become spirants, *kh, th, ph* (i.e., *x, θ, f*) in Av. before consonants. The original voiced aspirates *gh, dh, bh*, became in Av. simply voiced stops *g, d, b*. They are so preserved in the old Gāthā dialect; the younger dialect commonly resolves the latter before consonants and between vowels into spirants *y, s, w*. The sibilant *s* in Skt. initial becomes Av. *h*, as in Greek. Thus, Av. *hapta*, 'seven'=Skt. *saptá*. When internal, Skt. *s* may also appear as *əh*. Thus Av. *vaəhana-*, 'vesture'=Skt. *vásana-*. Final *-as* of Skt. appears regularly as *-ō*. Thus Av. *aspō*, 'horse'=Skt. *áśvas*. Sanskrit *rt* is often represented by *ṣ̊*. Thus, Av. *aṣ̊əm*, 'righteousness'= Skt. *ṛtám*.

The Gāthā dialect regularly lengthens all final vowels. It frequently inserts the anaptyctic vowels: G Av. *fərá* Y Av., *frā*, 'forth'=Skt. *pra*. Original *ns* appears as *ng;* G. Av. *daēvāng* (acc. pl.), Y Av. *daēvān*, 'denoms'=Skt. *dēvān*.

In inflection the Avesta shows nearly the richness of the Vedic Sanskrit. There are three genders—masculine, neuter, feminine; likewise three numbers—singular, dual, plural. The dual is not extensively used. There are eight well-developed cases of the noun and the adjective; the normal endings are: *Sing.*, Nom., *s;* Acc., *-əm;* Instr., *-ā;* Dat. *ē;* Abl. *-aṭ;* Gen. *-ō* (*-as*); Loc. *-i;* Voc. ——. *Dual*, Nom., Acc., Voc. *-ā;* Instr., Dat., Abl. *-byā;* Gen. *ās;* Loc. *-ō, -yō*. Pl. Nom. Voc. *-ō* (*-as*), *-ā;* Acc. *-ō* (*-as*), *-ā;* Instr. *bī;* Dat. *-byo* (*byas*); Gen. *ąm;* Loc. *-su, -hu, -šva*. The classes of declension agree exactly with the Sanskrit; the method of forming comparison of adjectives likewise corresponds. The numerals answer to Skt. forms, except Av. *aēva-*, 'one,' but Skt. *ēka-*, and Av. *baēvar*, '10,000,' but Skt. *ayúta*. The Av. pronouns closely resemble the Skt., but show also individual peculiarities. Noteworthy is the remote demonstrative Av. *ava, hāo*, 'that, yonder,' contrasted with Skt. *amú, asāu*. The verbal system in Av. and in Skt. is in general identical. The roots are chiefly monosyllabic and are subject to similar modifications in both. In voice, mode, and tense, and in their conjugation system the two languages quite agree. The endings show equal antiquity with the Sanskrit. The primary active endings in Av. are: Sing. 1, *-mi*, 2, *-hi*, 3, *-ti;* Dual, 1, *-vahi*, 3, *-tō, -θō;* Pl. 1, *-mahi*, 2, *-tha*, 3, *-nti*. The Av. possesses like facility with the Skt. in forming words by means of prefixes, and by adding suffixes of primary and secondary derivation. The same classes or compounds may be recognized in both tongues. The rules of Sandhi, or joining together of words in a sentence, so universal in Skt. are almost wanting in Avestan. The Avesta separates every word; the vowels are fully expressed as in Greek, etc., by individual letters. No diacritical points or accents are written in the texts. The metres in which the Gāthās are composed have analogues in the Veda. Almost all the metrical parts of the younger Avesta are in 8-syllable lines. The syntax, however, differs in a number of points from the Sanskrit, and shows certain marked individualities, especially in the later portions.

The best information in general will be found in the contributions by various scholars in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1895–1904). A new and complete edition of the Avesta texts has been published by Geldner (Stuttgart, 1885–96). The first full editions were by Westergaard (Copenhagen, 1852–54), and by Spiegel (Vienna, 1853–58). The latter is complete only for the Avesta in its narrower sense (Ys. Vsp. Vd.), the Khordah Avesta being omitted; but it gives the Pahlavi version.—Translations: Best for reference is the translation by Darmesteter and Mills in the *Sacred Books of the East* (3 vols., Oxford, 1880

et seq.), and especially the French version by Darmesteter, *Le Zend-Avesta* (Paris, 1892–93); F. Wolff, *Avesta, die heiligen Bücher der Parsen* (Strassburg, 1910).—Lexicons and Grammars: F. Justi, *Handbuch der Zendsprache* (Leipzig, 1864); De Harlez, *Manuel de l'Avesta* (Paris, 1882); Kanga, *Avesta Dictionary* (Bombay, 1899); Bartholomæ, *Altiranisches Wörterbuch* (Strassburg, 1904); Schuyler, Index of *Avestan Fragments* (New York, 1902); Bartholomæ, in *Grundriss der iranischen Philologie* (Strassburg, 1895); Jackson, *Avesta Grammar* (Stuttgart, 1891); Geldner, *Metrik der jüngeren Avesta* (Tübingen, 1877); Reichelt, *Avestisches Elementarbuch* (Stuttgart, 1911).—Readers: Jackson, *Avesta Reader* (Stuttgart, 1893); Reichelt, *Avesta Reader* (Strassburg, 1911).—Literature and Antiquities: Anquetil-Duperron, *Zend-Avesta, Ouvrage de Zoroastre*, etc. (Paris, 1771); Haug, *Essays on the Parsis*, new ed., by E. W. West (London, 1884). See also the introduction of De Harlez, *Avesta* (Paris, 1881); F. Spiegel, *Eranische Altertumskunde* (Leipzig, 1871–78); Sanjama-Geiger, *Civilization of Eastern Iran* (London, 1886); *The Spiegel Memorial Volume*, ed. by J. J. Modi (Bombay, 1908).

**AVEYRON**, ä'vā'rôn'. A department in the south of France, named after the river which traverses it from east to west (Map: France, S., G 4). It has an area of 3386 square miles and is one of the most mountainous parts of France, being situated between the highlands of Auvergne and the Cévennes. The principal rivers, of which the Lot alone is navigable, flow through the department from east to west. The climate is healthful, but cold and raw, especially in the north and east. North of the Lot, only rye and oats are grown; in the west grape culture is carried on. Coal is mined at Aubin and Milau, and slate and marble are quarried. Other leading industries include the manufacture of woolen goods, leather, and machinery. Pop., 1896, 386,303; 1901, 382,074; 1906, 377,299; 1911, 369,448. Capital, Rodez.

**AVEYRON.** A river in the south of France, rising near Séverac-le-Château and flowing west across the department of Aveyron. It receives the Viaur and enters the Tarn below Montauban, in the department of Tarn-et-Garonne. Entire length, 155 miles; navigable for the last 30.

**AVEZAC-MACAYA**, ä'vā'-zäk' mä'kī'yä', MARIE AMAND PASCAL D' (1799–1875). A French geographer. He was born at Bagnères de Bigorre and studied law, but after the appearance of his *Essais historiques sur le Bigorre* (2 vols., Bagnères, 1823), devoted himself entirely to geography. He was secretary of the Geographical Society of Paris from 1833 to 1835, and afterward became president of that body, being five times reëlected to the office. The following are his principal works: *Etudes de géographie critique sur une partie de l'Afrique septentrionale* (1836); *Esquisse générale de l'Afrique* (1837); *Description et histoire de l'Afrique ancienne* (1845); *Les voyages d'Améric Vespuce* (1860); *Le livre de Fernand Colombe* (1873).

**AVEZZANA**, ä'vĕt-sä'nä, GIUSEPPE (1789–1879). An Italian patriot and politician, born at Chieri, in Piedmont. He was an officer in the Piedmontese army, and for participation in the rising of 1821 was condemned to death, but escaped to Spain, where he fought for the Constitutional party. He was finally made prisoner by the French and deported to Cayenne. He succeeded in making his way to New Orleans and settled at Tampico, in Mexico, where he engaged in trade and took part in the political strife of the times. He received from Santa Anna the command in the three eastern states. Coming to the United States in 1834, he married, engaged in mercantile business with great success, but returned to Italy at the outbreak of the Revolution, in 1848. He was Minister of War of the short-lived Roman Republic, in 1849. After the taking of Rome he went to America. He joined Garibaldi in the Sicilian expedition and was a radical deputy in the new Italian Parliament. At the time of his death he was the active leader of the Irredentists. He died at Rome, Dec. 25, 1879.

**AVEZZANO**, ä'vĕt-sä'nō. A city in the province of Aquila, south Italy, 67 miles east of Rome (Map: Italy, H 5). It has a castle belonging to the Barberini. In the office of the estate of Prince Torlonia is a collection of objects found in the Lago di Fucino, the draining of which was attempted in ancient times, but accomplished only in 1875. When the Marsi complained of its frequent overflow, Cæsar elaborated a plan for constructing a channel, 3½ miles long, through Mount Salviano to the Liris (or Garigliano), which, at Capistrello, is 80 feet below the bottom of the lake. At one point the channel was 300 feet underground. The plan was imperfectly executed under Claudius, and improvements were made under Trajan and Hadrian; but in the Middle Ages Frederick II tried in vain to reopen the blocked-up passage. Finally Prince Torlonia, after an expenditure of over $8,000,000, succeeded where his imperial predecessors had failed, and now a road 35 miles long runs around the 42,000 acres of reclaimed ground, which are cultivated in modern fashion. Vine culture and farming are the principal occupations of the inhabitants of the district. Pop. (commune), 1881, 7380; 1901, 9442; 1911, 11,279.

**A'VIA'NUS**, FLAVIUS. A Roman fabulist, of the end, perhaps, of the fourth century A.D. He published a collection of 42 Æsopic fables in elegiac verse. These were translated into English by Caxton, and published with his *Subtyl Historyes and Fables of Esope* (1483). There are editions by Lachmann (1845) and Ellis (1887). Consult L. Müller, *De Phædri et Aviani Fabulis* (Leipzig, 1875).

**A'VIARY.** A suitable inclosure, within which living birds may be kept, usually out of doors, in a state of comparative freedom. An aviary is really only a large bird cage and is often seen in warm countries, especially in southeastern Europe, and many exist in England. In the United States, however, the extremes of climate make an outdoor aviary less practical for most private owners, and very few exist. They are increasing, however, and in the vicinity of our larger eastern cities many are erected each year. Indoor rooms devoted to birds are in effect simply large bird cages, and the care of such an aviary is essentially like that of a birdcage; but care should be taken not to put together birds that are not inclined to dwell peaceably with the others. The largest aviary known is the flying cage in the park of the Zoölogical Society of New York. It is a wire cage, supported by a steel-pipe frame, in the form of a Gothic arch, situated among trees, several of which are growing within it; and it measures

153 feet long, 72 feet wide, and 55 feet high. It is the home of herons, gulls, pelicans, and similar large forms, together with many smaller species in summer. Similar smaller aviaries exist for other classes of birds in this, and in the zoölogical gardens of Europe and India, and by the natural conditions and freedom for exercise they afford, have enabled many species to be kept in health and beauty which otherwise would hardly survive continual captivity, and certainly would not breed there as they constantly do in these huge cages.

The chief dangers which must be guarded against in the establishment of an aviary in the United States are heat, cold, rain, mice, owls, and cats. Abundant shade bushes and especially evergreens on the north side will regulate the extremes of sun and bitter winds and will enable the birds to avoid direct drenching rains. The size of the mesh should be as small as possible to keep out vermin, and if the cage cannot be covered at night, all perches should be placed near the centre and as far as possible away from the wire, to enable the birds to avoid direct attack from cats and owls. See CAGE BIRDS and bibliography, and the two monthly periodicals published in England, *The Avicultural Magazine* and *Bird Notes*.

**A'VIA'TION.** See AËRONAUTICS.

**AVICEBRÓN,** ä-vē'thā-brōn', SALOMON BEN GABIROL (c.1020–1070). A Jewish poet and philosopher, born at Malaga and educated at Saragossa, where, in 1045, he published a treatise on the correction of customs. His *Fons Vitæ*, or *Sapientiæ*, written in Arabic, was known to the scholastics in the Latin translation of Gondisalvi, and affected the teaching of Erigena, Amaury de Bène, David de Dinan, Roger Bacon, and Giordano Bruno. It was considered the work of a Christian philosopher, and as such his theory of the universality of matter there presented was ably upheld by Duns Scotus, but was severely attacked by Albertus Magnus and Thomas Aquinas. Avicebron belonged to the Jewish school of Jehuda Halevi and Kalis la Sarde, and some of his poems are preserved in the Jewish liturgy. After an unhappy life of wandering, he died at Valencia. Consult Guttmann, *Die Philosophie des Salomon ibn Gabirol* (Göttingen, 1889); Stephen S. Wise, *The Improvement of the Moral Qualities: An Ethical Treatise of the Eleventh Century by Solomon ibn Gabirol* (New York, 1901); M. Wittmann, *Zur Stellung Avencefrol's im Entwickelungsgang der arabischen Philosophie* (Münster, 1905).

**AV'ICEN'NA** (ABU ALI AL HUSAIN IBN ABDALLAH IBN SINA (980–c.1037). A great Arabic physician and philosopher. He was born at Efsene, a village in the neighborhood of Bokhara, in the month of Safar, in 980. His father held office under the Samanid ruler, Nuh ibn Manzur. Avicenna studied medicine and philosophy at Bokhara, and on account of a cure he received a post in court at the early age of 17. At his father's death Avicenna went to Nasa, Tos, Dahistan, Gurgan, Rai, and Hamadan. At this latter place he gained the favor of Shams al daula and was made vizier; but the opposition of the soldiery compelled him to relinquish this position. Under the successor of Shams al daula, Taga al daula, Avicenna was imprisoned in a fortress, but he managed to escape and fled to Ispahan. Here he spent the remainder of his days as court physician to Ala al daula, whom he accompanied even on his military campaigns. Avicenna led a very arduous life. Although he traveled a great deal, he still found time to write. He died about 1037.

Avicenna is of importance, not only in the history of Arabic medicine and philosophy, but also in the general history of medicine and philosophy. His great work, *Kanun fi'l tibb*, a system of medicine, based on the Arabic translation of the Greek medical works, long held first place both in the Orient and Occident as a text-book in medicine. In the Orient it is still very highly regarded. The work is characterized by systematic classification, sometimes even running to excess. A Hebrew version appeared in 1491. The Arabic text was published in 1593, at Rome, and again at Bulak. A Latin translation by Cremonensis appeared in Venice in 1595. In philosophy Avicenna teaches Aristotelianism, tinged, however, with Neo-Platonic ideas. He tries to reconcile philosophy and religion, an attempt often met with in the later Arabic and Jewish philosophers. His metaphysics appeared in a Latin translation in 1493; his logic in 1495, Venice; 1556, Basel. For an extended bibliography consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899); Carra de Vaux, *Avicenne*, vol. i, pp. 452 ff. (Paris, 1900); Wüstenfeld, *Geschichte der arabischen Aerzte* (1840); Ibn Khallikan, *Bibliographical Dictionary* (trans. by De Stone, 1842).

**AV'ICU'LIDÆ.** A family of large, thin, pseudolamellibranchiate bivalve mollusks, typified by the genus *Avicula*, the wing shells, so called because of their expansive method of growth. The family is numerous in all warm seas and goes back to Devonian times. It includes the pearl oysters and many queerly shaped forms, both fossil and recent, such as the hammer oysters and pinnas. See WING SHELL and Plate of ABALONE, ETC.

**AVIENUS,** ā'vĭ-ē'nŭs, RUFUS FESTUS. A Roman poet and official, who flourished during the latter half of the fourth century A.D. He is believed to have been proconsul, first in Africa (366), and afterward in Achaia (372), and was a pagan in religion. The works which have come down to us under his name are *Descriptio Orbis Tarrarum*, which is a Latin paraphrase, in hexameters, of the *Periegesis of Dionysius*, a translation, also in hexameters, of the *Phænomena* and *Prognostica* of Aratus, and a portion, amounting to 702 lines, of a poem called *Ora Maritima*. The last-named piece was a description, in Iambic trimeters, of the coasts of the Mediterranean, Caspian, and Black Seas. His style is superior to that of contemporary writers. The best edition of Avienus is that of Holder (Innsbruck, 1887).

**AVIGLIANO,** ä'vē-lyä'nō. A city in the province of Potenza, south Italy, on the Foggia-Potenza Railway, 65 miles south of Foggia (Map: Italy, K 7). It stands on a mountain, is surrounded by fir forests, and has marble quarries and mineral springs. Dynamite is manufactured. Pop., 1881, 13,000; 1901, 18,313; 1911, 17,413.

**AVIGNON,** ä'vē'nyōn' (Lat. *Avenio*, either from *avena*, oats, or from Celt. *avon*, water, referring to the rivers surrounding it). A French town and the seat of an archbishopric in the department of Vaucluse, of which it is the capital. It is situated on the left bank of the Rhône, on a lofty plateau, at a distance of 30

miles from the Mediterranean (Map: France, S., J 5). It presents a most striking appearance upon this wall-girdled height, on the summit of which rises the cathedral, and the impressive mass of the old papal palace; but the streets, as in most walled towns, are crooked, narrow, and often steep; the houses mean and dirty. There are, however, two fine promenades and some pleasant squares. The famous old bridge of Avignon still exists in part. The principal buildings are the venerable cathedral, Notre Dame des Doms, a grand and gloomy Romanesque structure, dating mainly from the time of the Crusades; the papal palace, a Gothic structure of the fourteenth century, with six towers, used for nearly a century as barracks, now a museum; the conservatory of music; the ancient archbishop's palace, now used as a seminary; the Musée Calvet, which contains Roman and other antiquities; and a picture gallery which is one of the best in the provinces. The public library contains 140,000 printed volumes and 32,000 manuscripts, and autographs. Avignon has a lyceum, two theological seminaries, the famous Académie de Vaucluse, and a botanical garden. The industries of the town comprise cotton spinning, paper making, distilling, tanning, the manufacture of agricultural implements, tin, copper, and hardware, chemicals, oil, velvet, taffeta, etc., and there is considerable trade in silk, wine, brandy, olive oil, truffles, grain, and flour; in fact, Avignon is the central wheat market of Provence. Pop., 1906, 48,312; 1911, 49,314. Avignon was a flourishing city under the Romans. Early in the Middle Ages it was part of the Burgundian Kingdom, upon whose dissolution it became a republic or commune, ruled by consuls. The city was the seat of the papal court, from 1309, when Clement V took up his residence there, until 1376, when Gregory XI left it to make Rome once more the papal metropolis. In the period immediately following, the antipopes, Clement VII and Benedict XIII, lived there. The city was the property of the papal see from 1348 to 1791, when it was seized by France. Petrarch, who lived there several years, first saw Laura at Avignon, in 1326. It is the chief seat of the Felibrige Brotherhood, organized about the middle of the nineteenth century to promote the revival of Provençal language and literature. Consult: Müntz, "La cour pontificale d'Avignon," in vol. xxii, *Revue des questions historiques* (Paris, 1899); Peujon, *Avignon; La ville et le palais des papes* (Avignon, 1905); O'Key, *Story of Avignon* (London, 1911).

**ÁVILA**, ä'vē-lä. A city of Spain, capital of the province of Avila and seat of a bishopric (suffragan to the arch-see of Valladolid), in Old Castile, 53 miles northwest of Madrid (Map: Spain, C 2), on the Adaja River. It stands on the slope of the bleak Castilian hills, surrounded by gray granite walls and castellated towers in perfect preservation, and is one of the most remarkable inland fortress cities in Spain. The walls are 40 feet high and 13 feet thick. There are 86 towers and 9 gates. The city is built largely of granite. There is a cathedral (which is one of the architectural glories of Spain), a military school, a seminary, a hospital, and royal woolen yarn factory. Pop., 1900, 11,885; 1910, 12,060. In the fourth century, the city was called Abula. It is the birthplace of St. Teresa, monastic reformer, and founder of the barefooted Carmelites. Outside the ancient walls, but within the precincts of the city, are the beautiful and interesting churches of Santo Tomás (with its superb marble monument to Prince John, only son of Ferdinand and Isabella, who died in 1497), and San Vicente (with its highly carved marble sarcophagus of the thirteenth century, which serves as a tomb for St. Vincent and his sisters, St. Sabina and St. Christeta, all of whom were martyred by having their heads cut off). Consult: Mélida, "Avila: Iglesias ojivales," in vol. cxxi, *La España moderna* (Madrid, 1899); Wilson, "Avila Cathedral," in vol. lxxxiii, *The Churchman* (New York, 1901); L. Ariz, *Historia de las grandezas de la ciudad de Avila* (Alcalá de Henares, 1607); Picatoste, *Tradiciones de Avila* (Madrid, 1888).

**ÁVILA**, GIL GONZÁLEZ DE. See GONZÁLEZ DÁVILA, GIL.

**ÁVILA Y ZÚÑIGA**, ä'vē-lä ē thōō'nyē-gä, LUIS DE (1500–64). A Spanish diplomatist and chronicler of the wars of Charles V, born at Plasencia, in Estremadura. He seems to have stood high in favor with the Emperor, whom he accompanied on his expeditions to Africa and on his campaign against the Schmalkald League, and who intrusted him with embassies to the Popes Paul IV and Pius IV. His *Comentarios de la guerra de Alemaña, hecho por Cárlos V en 1546 y 1547* (written after Charles V had retired to Yuste, where Avila frequently visited him from his own retirement at Plasencia) is valuable as the record of an observant eyewitness; but its evident spirit of partiality justifies the Emperor's own comment: "Alexander's achievements surpass mine, but he was less lucky in his chronicler." The latest edition is that of Madrid, 1852. The work has been translated into several languages.

**AVILÉS**, ä'vē-lās'. A seaport of some importance in the province of Oviedo, Spain (Map: Spain, C 1). It is situated 19 miles north by west of the city of Oviedo, at the mouth of the chief branch of the Río de Avilés, which is here crossed by a noteworthy bridge, and is navigable at high water for vessels of the largest size. It has several good squares, handsome buildings, and gardens. In addition to the castle, the two churches, three monasteries, and a hospital, there is a naval academy. Pottery and weaving are the industries of the town. There are copper mines in the vicinity, and a considerable trade is carried on in articles of copper, as well as in coal, which is obtained not far from the town. Pop., 1900, 12,763; 1910, 13,661. The *Fuero de Avilés* (second half of the twelfth century) is the oldest city charter to be drafted in the vernacular. Its exact date is in dispute. Consult A. Fernández-Guerra y Orbe, *Fuero de Avilés* (text and discourse, Madrid, 1865), and for the opposite side, J. Arias de Miranda, *Refutación al discurso del . . . Sr. D. Aureliano Fernández-Guerra y Orbe* (Madrid, 1867). Consult also Baist in Gröber's *Grundriss der romanischen Philologie*, vol. ii, 2, p. 387 (Strassburg, 1897). The city took a prominent part in the War of Independence and in the first Civil War.

**AVISON**, CHARLES (1710–70). An English composer. He was born at Newcastle, England, where, after having studied in Italy, he became organist in 1736. He wrote an *Essay on Musical Expression* (1752), in which he ranked the French and Italian composers above the Germans, and which created a considerable stir in the musical world of the time. He composed

sets of concertos and sonatas which were very popular. He figures in Browning's *Parleyings with Certain People.*

**AVI'TUS,** ALCIMUS ECDICIUS (?–c.525). A French ecclesiastic. He became Bishop of Vienne in Burgundy and was of very considerable prominence in the Church at that time. At a conference held in 499 between Arian and Roman theologians, he was the chief representative of the Romans, and by his influence there, together with his subsequent conversion of King Sigismund of Burgundy, did much to check the spread of Arianism in that kingdom and throughout Gaul. He also presided in 517 at the Synod of Epaone, which established 40 canons in definition of the relations of the Church in Burgundy toward the civil power and more especially toward heretics. Of his extant writings, comprising homilies, epistles, and poems, the most important is the didactic epic, *De Spiritalis Historiæ Gestis* (wrongly known as *De Mundi Principio*). His collected works were edited by Sirmond, *Bibliotheca Maximorum Patrum*, vol. ix (1643). Consult: Binding, *Geschichte des burgundischen Königreichs* (Leipzig, 1868); P. N. Frantz, *Avitus von Vienne als hierarch und politiker* (Greifswald, 1908); Henri Goelzer, *La latin de Saint Avit, évêque de Vienne* (Paris, 1909).

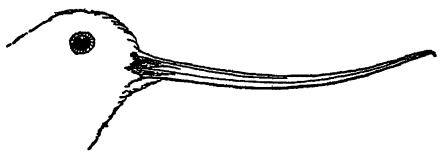
**AVIZ,** ä-vēsh'. An order of knighthood, instituted by Alfonso I of Portugal in the middle of the twelfth century in order to aid in the defense against the Moors. In 1162 the order was organized by the Pope, and soon after the seat was removed to Aviz, which had recently been captured from the Moors and from which it took its present name. From 1213 to 1385 it was practically united with the Order of Calatrava. Later the grand mastership was united with the crown. In 1789 the order was secularized and membership bestowed as a reward of merit either upon natives of the country or foreigners for marked service to Portugal. The order was extended to Brazil in 1823 and has since become recognized as a national order in Brazil. The Emperor was formerly the grand master.

**AVLONA.** See VALONA.

**AVO'CA.** A borough in Luzerne Co., Pa., 10 miles northeast of Wilkesbarre, on the Central of New Jersey, the Erie, the Delaware and Hudson, and the Lehigh Valley railroads (Map: Pennsylvania, K 4). It has important coal-mining interests and manufactures silk. Avoca has an opera house, a theatre, and churches of several denominations. Pop., 1900, 3487; 1910, 4634.

**AVOCADO,** ăv'ō-kā'dō, *Sp. pron.* ä'vō-kä'ᴅō (from Mex. *ahuocatl*), or ALLIGATOR PEAR (*Persea gratissima*). In old times it was known to sailors as "Midshipman's butter." One of a genus of plants of the family Lauraceæ, comprising 100 species or more, all natives of subtropical Asia or America. It is a native of the West Indies and Central America and is the only species of this order cultivated for its fruit. The flowers are green, about half an inch across. The leaves are elliptical, narrow toward the base, about 6 inches long. The fruits vary in shape from oblate, through spherical and pyriform, to long bottle-shaped, and in color from light green to dark green, purple, brown, and red. The flesh of the fruit when properly ripened is of the consistency of firm butter and in flavor somewhat rich and nutlike. The fruit is very unusual in that the flesh has a high fat content, 10 per cent on an average. The water content is 81 per cent, and the carbohydrates 7 per cent. The fuel value is high, 512 calories per pound. In regions where it grows avocado fat is sometimes recovered for industrial uses. It is primarily a salad fruit to be served with salad dressing, but is also used as a dessert with sugar and cream, wine, and lemon or orange juice. In the tropics it is often eaten in soup. It finds a ready sale in the large cities of the United States and is cultivated chiefly in the southern part of Florida, in Hawaii, and in southern California. For illustration, see ALLIGATOR PEAR on ABUTILON Plate.

**AVOCET** (Fr. *avocette*, Sp. *avoceta*, of unknown origin). A limicoline bird, one of a group of four species. Avocets are united with the stilts in the family Recurvirostridæ and are related to the snipe and sandpipers. Avocets are about a foot and a half in length, with long, very slender wading legs, short webbed toes, and remarkably long, thin, and upcurved bill. They frequent marshes and search shallow water with their sensitive beaks for crustaceans, snails, and



BEAK OF AN AVOCET.

similar small prey. The several species dwell in summer in the temperate parts of both the Old and the New World, migrating to the tropics in winter. They form simple nests upon the ground in marshy places and lay four olive or buff eggs, thickly spotted with dark brown. The principal American species (*Recurvirostra americana*) has whitish plumage, with the wings black, and the head, neck, and breast light cinnamon. It is common in the western States and shot as game. Consult Coues, *Birds of the Northwest* (Washington, 1874).

**AVOGADRO,** ä'vō-gä'drō, AMADEO, CONTE DI QUADREGNA (1776–1856). An Italian physicist. He was born at Turin and became professor of physics there in 1820. He was the author of a large number of scientific memoirs and first published his celebrated rule in the *Journal de Physique*, in a paper entitled "Essai d'une manière de déterminer les masses relatives des molécules élémentaires des corps, et les proportions selon lesquelles elles entrent dans les combinaisons." See AVOGADRO'S RULE.

**AVOGADRO'S RULE.** One of the fundamental principles of chemistry. It is usually formulated as follows: Under the same conditions of temperature and pressure equal volumes of gases and vapors contain equal numbers of molecules. It may appear strange, at first sight, that an idea of this nature should be incorporated in the very foundation of an exact science like chemistry. For the very conception of matter as made up of molecules is nothing but an hypothesis; and even if this conception is correct, the number of particles in a given mass of matter could of course never be actually counted. The following considerations, however, will show at once the real significance of Avogadro's rule. An immediate consequence of the rule is, that comparing equal volumes of substances in the

gaseous state, as to weight, composition, etc., is the same as comparing single molecules. Following the rule, chemists have therefore adopted as the standard quantity for investigation, not a unit of weight, but a unit of volume, and have for many years now been comparing, not equal weights of substances, but equal volumes. Now, this practice has led to the acquirement of a stupendous amount of purely empirical information that forms a solid part of the science of chemistry, the original rule merely explaining *why* comparing equal volumes should lead to so many excellent results. If, therefore, the atomic hypothesis should sometime be discarded as no longer necessary, the hypothetical form of Avogadro's rule would of course go with it; but its corollary, the expediency of comparing equal volumes of substances, would still remain a great guiding rule in the science of chemistry.

The rule was originally proposed as an addition to the atomic theory, the purpose being to account for a remarkable general fact then recently discovered by Gay Lussac; viz., that when two gases react with each other chemically, their reacting volumes bear to each other a ratio that can be expressed by small integral numbers. Thus, when hydrogen and chlorine unite to form hydrochloric acid, the volumes of the reacting gases are equal, i.e., their ratio is $1 \div 1$. Similarly, equal volumes of hydrochloric-acid gas and ammonia combine to form sal-ammoniac; i.e., the ratio is again $1 \div 1$. In the formation of water from hydrogen and oxygen, these two gases unite in the simple ratio of $2 \div 1$. Gay Lussac's law holds equally good in the case of gaseous products of chemical decomposition and with regard to the ratios of the volume of a gaseous compound to the volumes of its gaseous chemical components. Thus, 3 volumes of hydrogen and 1 volume of nitrogen are produced by the decomposition of 2 volumes of ammonia. This law, examined from the standpoint of the atomic hypothesis, indicates that some very simple relation must exist between the numbers of particles contained in the reacting volumes of gases. For according to that hypothesis all chemical reactions of substances take place really between their particles. The simplest relation that suggests itself to the mind is expressed by Avogadro's rule; viz., that equal volumes of gases contain equal numbers of molecules. If, then, the reacting volumes of hydrogen and chlorine are equal, it is because every single molecule of chlorine reacts with one single molecule of hydrogen. Although it thus formed a plausible explanation of Gay Lussac's law, the idea, when first advanced by Avogadro in 1811 and resuggested by Ampère in 1814, was not accepted by the scientific world. The scanty stock of experimental knowledge of the time did not warrant the incorporation in science of a general theoretical principle of this nature.

The practical importance of the rule is mainly in the fact that it permits of ascertaining the relative weights of molecules ("molecular weights"), these weights being represented, according to the rule, by the relative weights of equal volumes of substance in the gaseous state. The substance with which all other substances are usually compared is hydrogen, to which chemists assign the molecular weight 2, since its molecule is supposed to consist of two atoms of unit atomic weight (the unit is of course arbitrary and is chosen merely for convenience sake). Comparing equal volumes of hydrogen and oxygen, the latter is found to weigh 16 times as much as the former. The molecular weight of oxygen is, therefore, in accordance with Avogadro's rule, said to be 32. In a similar manner the molecular weight of any other substance in the gaseous state may be ascertained by multiplying the density (i.e., its relative weight with respect to hydrogen) by 2. Thus, the density of ammonia gas being about 8.5, its molecular weight is 17; the density of hydrochloric-acid gas being about 18.25, its molecular weight is 36.5, etc.

Now, equal volumes of ammonia gas and hydrochloric acid combine to form ammonium chloride (sal-ammoniac, $NH_4Cl$) and nothing else. Both the chlorine of hydrochloric acid and the nitrogen of ammonia represent the smallest relative weights of those elements found in any compound; or, in the language of the atomic theory, hydrochloric acid contains only one atom of chlorine, and ammonia only one atom of nitrogen. Hence, one entire molecule of hydrochloric acid (molecular weight = 36.5) and one entire molecule of ammonia (molecular weight = 17) must be combined in one molecule of ammonium chloride; for otherwise the latter compound could not, as it does, contain both chlorine and nitrogen. Consequently the molecular weight of ammonium chloride could not possibly be less than $17 + 36.5 = 53.5$, and hence its density could not, according to Avogadro's rule, be less than $53.5 \div 2 = 26.75$. When, however, ammonium chloride is heated and its vapor studied experimentally, the density is found to be only about one-half as great. This fact was for a long time regarded as proving that Avogadro's rule is incapable of general application, although in most other cases the molecular weights obtained with the aid of the rule were found to agree thoroughly with the chemical behavior of the compounds. But even in the case of ammonium chloride, the exception was finally shown to be only apparent. Pebal and Than, namely, demonstrated that when ammonium chloride is evaporated, it breaks up into its constituents, ammonia gas and hydrochloric acid, the dissociation naturally causing an increase of volume, and hence a decrease of density. As long as the products remain mixed in a vessel, or are allowed to escape together, it is impossible to prove directly that the vapor is a mixture of ammonia and acid, the reaction with litmus paper being of course neutral. But Pebal and Than proceeded as follows: They divided a glass tube into two parts by a porous partition and heated a lump of ammonium chloride in one part of the tube; the ammonia gas produced, diffusing through the partition more rapidly than the hydrochloric acid, soon filled the other part of the tube and showed the ordinary alkaline reaction with red litmus paper (i.e., turned it blue). The case of ammonium chloride thus changed from an exception into an additional indication of the correctness of Avogadro's rule.

The principal arguments in favor of the rule may be briefly summed up as follows:

1. Avogadro's rule furnishes the chief method of ascertaining the atomic weights of the chemical elements, and there are very strong reasons for believing that the atomic weights thus obtained represent the true numbers characterizing the elements. See PERIODIC LAW.

2. The modern theories of the chemical constitution of compounds could not have come into existence and could not be applied in individual cases, if the molecular and atomic weights to which the rule leads were unknown. Avogadro's rule is at the very foundation of those theories; and hence, conversely, the correctness of the theories, as indicated by the numerous triumphs achieved by them for both pure and applied chemistry, is to be considered as strong proof in favor of the fundamental rule.

3. The strongest argument in favor of Avogadro's rule in its hypothetical form lies in the fact that it follows, by mathematical deduction, from the kinetic theory of gases. (See GASES, PROPERTIES OF.) The correctness of this theory, on the other hand, is strongly indicated by the fact that it also leads to those laws of gases which have long been established experimentally.

Avogadro's rule can evidently hold good only in those cases in which the gases or vapors in question behave very nearly in accordance with the laws characteristic of matter in the perfectly gaseous state; i.e., if at constant temperature the volume varies inversely as the pressure, and if under constant pressure the volume varies as the absolute temperature. For if under equal pressures and temperatures different gases did not always occupy equal volumes, then equal volumes could not always contain equal numbers of molecules.

The rule is sometimes spoken of as the law of Avogadro and Gerhardt, the latter chemist having done much toward establishing it on a firm scientific basis. Gerhardt's pupil, Cannizzaro, continued his researches, and finally succeeded in demonstrating to the scientific world its great importance. In 1886 Van't Hoff showed the rule to be applicable not only to gases and vapors, but also to substances in solution, and, as a consequence, the rule is also often referred to, especially by German authors, as the rule of Avogadro-Van't Hoff. Consult: Avogadro's original memoir on the molecular theory, German trans., *Ostwald's Klassiker der exakten Wissenschaften*, No. 8; and Cannizzaro, "Abriss eines Lehrganges der theoretischen Chemie," *Ostwald's Klassiker*, No. 30. See also ATOMIC WEIGHTS; MOLECULES—MOLECULAR WEIGHTS; SOLUTION; CHEMISTRY.

**AVOID'ANCE.** See BENEFICE.

**AVOIRDUPOIS,** ăv'ẽr-dû-poiz', or **AVERDUPOIS'** (ME. *aver de peis*, OF. *aveir de peis*, equivalent to ML. *averia ponderis*, goods of weight). The name given to the system of weights and measures applied in Great Britain and America to all goods except the precious metals, precious stones, and medicines.

The grain is the basis of the avoirdupois system as well as of the troy. A cubic inch of water weighs 252.458 grains. Of the grains so determined, 7000 make a pound avoirdupois, and 5760 a pound troy. (See WEIGHTS AND MEASURES.) The avoirdupois pound is divided into 16 ounces and the ounce into 16 drams. A dram, therefore, contains 27 11-32 grains, and an ounce 437½ grains.

TABLE OF AVOIRDUPOIS WEIGHT

| | | | |
|---|---|---|---|
| 27.34375 grains | are 1 dram. | | |
| 16 drams or drachms | " 1 ounce | =437½ grains. | |
| 16 ounces | " 1 pound | =256 drams= | 7000 grains. |
| 28 pounds | " 1 quarter | =448 ounces. | |
| 4 quarters | " 1 hundredw't | =112 pounds. | |
| 20 hundredw't | " 1 ton | =80 q'rs= | 2240 pounds. |

A cubic foot of water weighs 997.14 ounces avoirdupois, or nearly 1000 ounces, which gives an easy rule for determining the weight of a cubic foot of any substance from its specific gravity. Avoirdupois is the weight used in the United States, where, however, in most places, the hundredweight contains only 100 pounds, and the ton, 2000 pounds.

**AVOLA,** ä'vō-lä. A city in Sicily, 20 miles southwest of Syracuse (Map: Italy, K 11). The chief industries of the town are sugar refining and the manufacture of straw matting. Fine almonds are grown in the vicinity. Pop., 1901, 16,264; 1911, 17,711.

**AVON,** ā'von (Celt. *avon*, Welsh, *afon*, Gael. *abhain*, *abhuinn*, water, river, probably akin to Lat. *aqua*, water). The name of several rivers in England and Scotland. The more important are: the Upper Avon (93 miles long), which rises in Northamptonshire and flows through Stratford, the birthplace of Shakespeare ("the Swan of Avon"), entering the Severn at the northern boundary of Gloucestershire (Map, England, D 4); the East Avon, which rises in Wiltshire and flows in a southerly direction, entering the English Channel at Christchurch (Map: England, E 6); the Lower Avon, which rises in Gloucestershire, flows through Wiltshire and Somersetshire, and enters the Bristol Channel 6 miles below Bristol.

**AVON.** A village in Livingston Co., N. Y., 18 miles south by west of Rochester, on the Erie Railroad and the Genesee River (Map: New York, C 3). The village has pea and corn canneries, a bean-shipping plant, and owns its water works. It is noted for its mineral springs. Pop., 1900, 1601; 1910, 2053.

**AV'ONDALE.** Formerly a city in Jefferson Co., Ala.; now incorporated with Birmingham, which is 2 miles east. Avondale was settled in 1884 and has manufactures of cotton gins and building materials. See BIRMINGHAM.

**AVOW'RY** (OF. *avouerie*, from *avouer*, to avow, from Lat. *ad*, to + *vocare*, to call). The technical name of the pleading interposed by the defendant to the plaintiff's declaration, or complaint, in an action of replevin (q.v.). By this plea the defendant avowed or acknowledged his seizure of the chattels claimed by the plaintiff, and justified the act by setting up the facts upon which he relied to show that he was entitled to make the seizure complained of. Under modern practice the action of replevin has largely lost its technical character, and its procedure has become assimilated to that of the more common and simple forms of action; but the plea of the defendant, under whatever name, retains substantially the character of the avowry. Consult the authorities referred to under PLEADING.

**AVRANCHES,** ä'vrănsh' (anciently, *Abrinca*, capital of the *Abrincatui*, a nation of Gaul). An old town in the department of Manche, France, near the left bank of the Sée, 33 miles east of Saint-Malo (Map: France, N., D 4). It is beautifully situated on a high hill, which extends in a long ridge and is ascended by zigzag roads built on terraces. This hill commands a very wide and beautiful view of a finely wooded and cultivated district, with a winding river, which attracts summer visitors in great numbers. There are a public and a botanical garden, and a public library containing among other things several ancient manuscripts. There are considerable manufactures of lace, calico, and cloth, as well as tanneries, machine shops, planing mills,

and breweries. Many of the inhabitants are engaged in fishing, and there is an active trade in farm produce. Pop., 1906, 7360; 1911, 7174. Avranches was formerly a bishop's see, and its cathedral, which was destroyed in 1790, was one of the most magnificent in Normandy. A stone still preserved on its site is said to be that on which Henry II of England kneeled before the papal legate to receive absolution for the murder of Thomas à Becket. It was a place of importance during the Roman period, and some of the old Roman ramparts are still standing. It was afterward a frequent object and scene of strife during the wars between the French and the English. Consult Le Héricher, *Avranchin monumental et historique* (Avranches, 1845–46).

**AVUL'SION** (Lat. *avulsio*, a tearing off, Fr. *a;* from + *vellere*, to tear away). The sudden transfer by natural forces of a portion of one man's land to the soil of another. The term is applied as well to the result of a sudden change in the course of a boundary river, the reliction or encroachment of the sea, as to an actual tearing away of a portion of A's land and its deposit upon or against the land of B, as the result of a flood. The title to the soil so carried away or transferred is not affected by the physical change in its situation, and the owner is entitled to recover the possession thereof from the person to whose soil it has become annexed. In this respect it differs from accretion, or a gradual and imperceptible addition to the land of a riparian proprietor by the action of the water. (See ACCRETION.) Thus, if the sea permanently recedes so rapidly that the reliction of the water is perceptible in its progress, the case is one of avulsion, and the land exposed continues to be the property of the State, as when it was still covered by the sea. This rule may be varied by custom, however, as in the case of the river Severn, below Gloucester Bridge, which (says Lord Hale) "is the common boundary of the manors of either side, what course so ever the river takes," and in the case of the Missouri River, as to which a similar doctrine has been laid down by the United States Supreme Court, to cover the effect of the rapid current of the river upon the loose soil composing its banks (Nebraska *v.* Iowa, 143 U. S. 359). Even here, however, the court is careful to distinguish the case of the cutting of the new channel above Omaha in 1873, which is described as an avulsion and as leaving the land titles on either side up the stream unaffected. See ALLUVION; RIPARIAN RIGHTS; RIVERS; SEA SHORE.

**AWAJI,** ä'wä-jē. The largest island in the Inland Sea of Japan, at its eastern entrance, and pertaining to Hiogo Ken. It is 34 miles long, contains 218 square miles, and has a population (1898) of 188,908. In mythology Awaji was the first island created by Izanagi and Izanami; the name in legend meaning 'my shame,' but actually the 'way of Awa.' It is famous for its wonderful scenery and noted for a peculiar grade of pottery.

**AWANTIBO,** ä'wän-tē'bō, or **ANGWANTIBO,** än'gwän-tē'bō (native name in west Central Africa). A small light-brown lemur (*Perodicticus* or *Arctocebus calabarensis*), also called the Calabar potto, and distinguished by the absence of any visible tail, and by the rudimentary condition of the index finger of the hand, while the thumbs on all the feet are greatly enlarged and separated from the fingers, forming of the feet powerful grasping organs. The animal is rare, and its habits are little known.

**AWARD'** (OF. *eswarder*, look at, consider, decide, from *es* (Lat. *ex*) + *warder*, observe, guard, from OHG. *warten*, to watch). The formal adjudication of a matter in dispute by arbitration or by referees to whom it has been referred. An arbitration being an extra-judicial proceeding, the award does not have the force of a judgment; but it may, if made by official or judicial referees, be the basis of a judgment, and, if made by private arbitration, it becomes legally binding upon the parties thereto. The submission to arbitration involves an agreement to abide by the result thereof, and thus the award becomes a term of the contract, enforceable as such. In order to be binding, however, it must be consonant with the submission, must be limited to the parties agreeing thereto and to the matters in dispute, and must be final, certain, and specific. See ARBITRATION.

**AWATA,** ä'wä-tä. A village in the suburbs of Kioto, Japan, famous for its yellow faïence. Awata pottery was invented in the seventh century, is decorated, and by the Japanese is called "Tamago Yaki" ('egg-ware'). It is largely exported to the United States.

**AWE,** ą, LOCH (Gael. *abh*, water). A lake in the centre of Argyllshire, Scotland, 23 miles long and 1 mile broad (Map: Scotland, C 3). Its surroundings are very picturesque and in some parts even striking. It is covered with numerous wooded islands, and its northern end is shadowed by a rocky mountain chain over 3000 feet high. It is drained by the river Awe, which enters the Loch Etive. Its largest feeder is the Orchy, from the northeast. There are numerous castles on several islands in the loch, some of them dating from the thirteenth century. The loch is traversed by steamers, and there is a railway station on its northern shore.

**AWN.** See GRAMINEÆ; GRASSES.

**AWOMORI,** ä'wō-mō'rē. See AOMAORI.

**AXAYACATL,** ä'chä-yä-kä't'l (Mex. Face-in-the-water) (?–1477). An Aztec chief, styled, in contemporary narratives, Emperor of Mexico. He is reported to have been the father of Montezuma, whom Cortés conquered. About 1467 he led his Aztecs to the conquest of Tehuantepec, and afterward crushed a rebellion that threatened his capital, the City of Mexico. He died suddenly, about 1477. Half a century later the soldiers of Cortés occupied Axayacatl's "palace," which was the large communal dwelling of the section of the tribe to which Axayacatl belonged. In one of the rooms they found an immense treasure of gold and silver in ore and bars, with jewels, and many curious articles of manufacture.

**AXE** (Ger. *Ax, Axt;* Lat. *ascia;* Gk. ἀξίνη, *axinē*). An instrument used for felling trees and chopping wood. The axe is one of the earliest tools used by man, being found among the relics of the Stone, Bronze, and Iron ages. It was fashioned sometimes of syenite or black sandstone, as by the lake dwellers of Europe; of jade, as by ancient peoples of Asia and Asia Minor and by the modern Maoris; of flint or bone, as by the American Indians; of mixed copper and tin, as by the Romans, ancient Mexicans, and South Americans; of copper, as by the Druids. To this day stone axes are used in some of the South Sea Islands. The American axe usually consists of a head or butt of wrought iron, heated to a white heat, cut to the desired length, and then, after the eye for the handle is punched through,

reheated and pressed between concave dies into proper shape. Again heated, it is grooved on the edge; with borax as a flux, the arched edge piece of steel is inserted, projecting an inch or more; the iron and steel are then welded at white heat, and after it is hammered, ground to a fine edge, tempered and polished, the head is varnished to prevent rust. Forms and weights vary according to the use to which the tool is to be put. For very hard timber the edge is narrow and the whole axe heavy. Common forest axes weigh from 3 to 7 pounds. The handle is generally made of hickory, which is not only strong, but elastic. The pickaxe, used for breaking up hard ground, is not strictly an axe. The hatchet (Fr. *hachette*, a little axe) is for use with one hand only. The "francisca," at one time the national weapon of the Franks, was a hatchet for throwing, and the tomahawk (q.v.) of the North American Indians was, as is well known, used in a similar manner and in hand-to-hand combat. The adze, a tool used for the chipping or rough planing of horizontal surfaces by carpenters, has its blade at right angles to the handle, and so curved that the plane of the cutting edge, as the instrument is swung into contact, is horizontal. Broadaxes, formerly much used for hewing logs into square timbers, are axes with very broad blades, and the cutting edge much less curved than the edge of the regular axe for chopping.

**AX'EL**, or ABSALON (c.1128–1201). Archbishop of Lund, after 1178, and minister and general of Waldemar I and Canute VI of Denmark. He was descended from a distinguished Danish family and in his youth studied at Paris. Axel distinguished himself by wisdom, uprightness, and valor. He drove the Wendish pirates from the Danish coast, attacked them in their own settlements on the island of Rügen, and annexed the island to Denmark. He defeated the Pomeranian fleet in 1184. In the wise legislation of Waldemar and of his son he had a great part. He promoted learning and art, and to his encouragement we owe the first connected history of Denmark by Saxo Grammaticus. In building a fortified castle for defense against the pirates he laid the foundation of the future city of Copenhagen, then an insignificant village inhabited only by fishermen. Owing to this origin, Copenhagen has sometimes been called Axelstadt. Axel lies buried in the church of Sorö, where he founded a monastery.

**AXHOLME**, ăks'hōlm, or AXELHOLM (AS. *holm*, island in a river; Eng. *holm*, hill, islet). An island in the northwest of Lincolnshire, England, formed by the rivers Trent, Don, Idle, and Vicardyke. Area about 74 square miles. It incloses various parishes, of which Epworth is the chief. Abundant crops are raised by small landowners. Formerly a marsh which succeeded an ancient forest, it was reclaimed in 1634, after five years' labor, by Vermuyden, a Dutchman, under contract from Charles I. The land became very fertile under Dutch and French Protestant immigrants, the introduction of which antagonized the local peasantry. Litigation which ensued ended in 1691, the natives receiving 10,532 acres and the settlers 2868. The accent and physical characteristics of the settlers exist in the present inhabitants. Pop., 1911, 6815. Consult Peck, *Isle of Axholme* (1815), and Peacock, in *Anthropological Review* (1870).

**AX'IL.** See LEAF.

**AXIM**, ä-shēng' *or* ăks'ĭm. A seaport in the British Gold Coast colony, 70 miles west of Cape Coast Castle (Map: Africa, D 4). It was built by Portuguese, and its harbor is the best on the Gold Coast. The town is picturesque, and is an important point because of large exports of mahogany. Gold is found in small quantities. In 1642 it was taken by the Dutch, who in 1872 ceded it, with the whole of their possessions in Guinea, to the English. Pop., 2189.

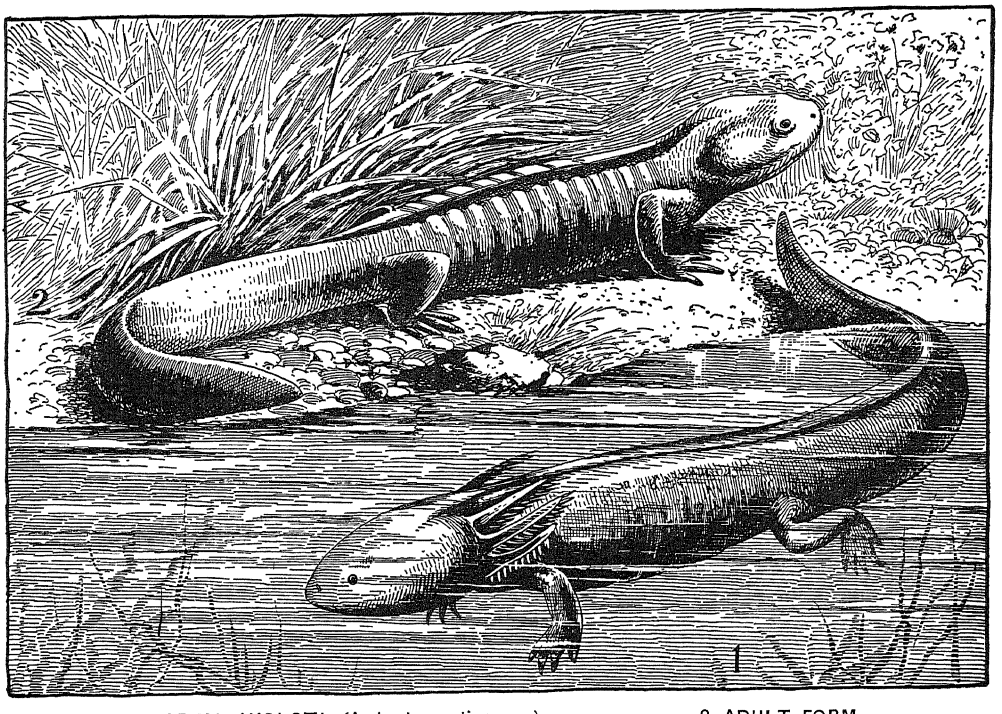
**AX'INITE** (Gk. *ἀξίνη, axinē*, axe; referring to its edged crystals). An aluminum and calcium borosilicate, with some of the calcium replaced by varying amounts of iron and manganese, which crystallizes in the triclinic system. It is found in the form of brown, bluish, or yellow crystals, edged like an axe, in various localities in Europe, notably Dauphiné, France, and Scopi, Switzerland, where the crystals are cut into beautiful brown gems. It has been found in the United States near Bethlehem, Pa., and in Maine, but in crystals that are too small for cutting.

**AXIN'OMAN'CY** (Gk. *ἀξίνη, axinē*, axe + *μαντεία, manteia*, divination). A kind of divination practiced in ancient times by means of an axe. The ancients tell us nothing with regard to its method or its use. See SUPERSTITION.

**AX'IOM** (Gk. *ἀξίωμα, axiōma*, that which is thought worthy, fit, self-evident). A general statement, the truth of which is accepted without proof. Plato probably limited it to geometric propositions, but Aristotle applied it to statements of a more general nature. Euclid followed Aristotle's use of the term, regarding axioms as "common notions" not limited to geometry, and applying the term *postulate* to a premise specifically geometric in character. The early English translators of Euclid failed to consult the most trustworthy sources, and hence the terms *axiom* and *postulate* have come to be confused. Heiberg, the latest and best editor of the *Elements*, has made clear the distinction which Euclid recognized, and has shown that he gave five axioms and five postulates. Euclid regarded as an axiom that, "If equals be added to equals, the sums are equal"; as a postulate that (stated in simpler language than his), "Through a given point only one line can be drawn parallel to a given line." The first statement is general, the second is specifically geometric. Mathematicians formerly sought to limit the list of axioms and postulates to the smallest number upon which the subject in question, as geometry, could be built; the modern tendency is rather to seek a list, however extended, of the really independent properties of space. To the followers of Kant seems due the common definition of axiom as "a self-evident truth," a definition no longer recognized as valid. See A PRIORI; GEOMETRY.

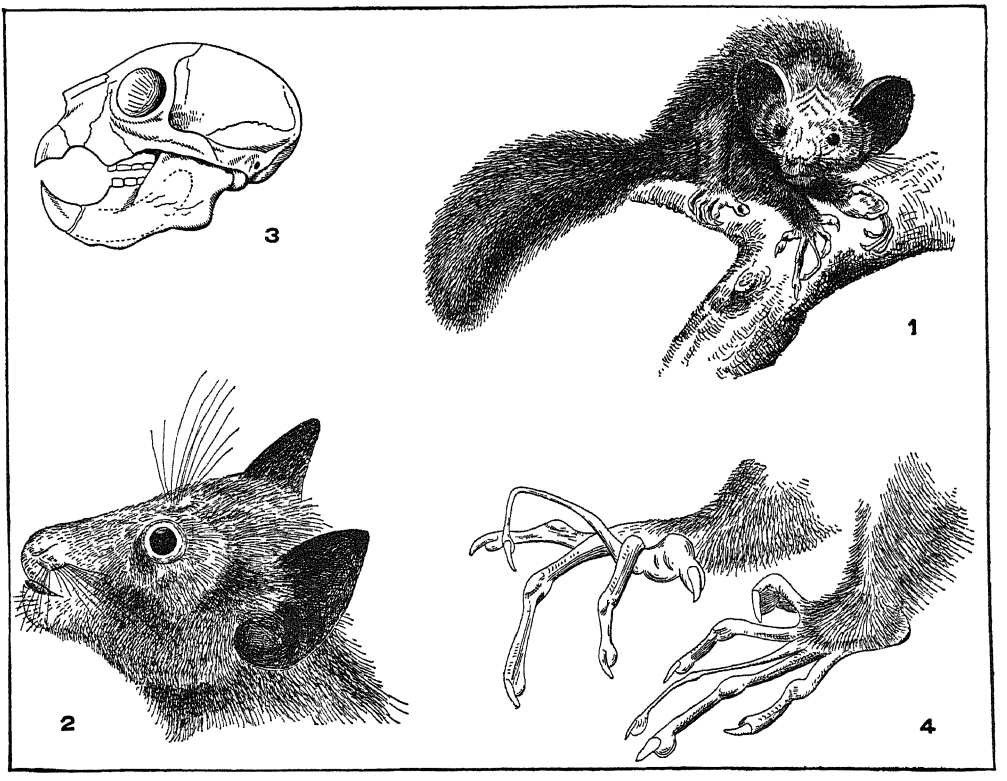
**AX'IS** (Lat. *axis*, axle). In geometry, a line (usually straight) such that the points of a given figure are symmetrically situated on opposite sides of it; as, for example, a diameter or diagonal of a square, the perpendicular from the vertex to the base of an isosceles triangle, a diameter of a circle or sphere. The axis bisects at right angles the line joining any two corresponding points of the figure. In this connection the axis is called an *axis of symmetry* of the figure. *Axes of coördinates* are the lines of reference from which the coördinates are measured. (See ANALYTIC GEOMETRY.) The *radical axis* of two circles is the line joining their points of intersection; the

## AXOLOTL




1. LARVAL AXOLOTL (Ambystoma tigrinum). 2. ADULT FORM.

## AYE-AYE




1. AYE-AYE (Chiromys madagascariensis).
2. HEAD IN PROFILE (enlarged).
3. SKULL.
4. RIGHT AND LEFT HANDS, showing attenuated digits.

line is real, even when the circles cut in imaginary points. The *transverse* (or *major*) *axis* of a conic is the diameter which passes through the foci. The *conjugate* (or *minor*) *axis* is the line through the centre perpendicular to the transverse axis.

In physics, the *optic axis* of a lens is the straight line passing through its optical centre and perpendicular to its surfaces. The *axis of a telescope* is the straight line joining the centres of its lenses (objective and ocular). In mechanics, the *axis of rotation* of a body is a straight line about which the body rotates, as the *polar axis* of the earth.

In architecture, axis is either the temporary central line used in making drawings or the imaginary central line of a building. Sometimes buildings have a curved axis, sometimes several have a common axis. The relation of the axis of neighboring monumental structures has always been a matter of careful study in architectural history.

**AXIS.** The second vertebra of the spinal column, so called because it forms the pivot upon which the first bone (atlas, q.v.) rotates, carrying the skull. A strong tooth-like process extends perpendicularly upward, interlocking with the atlas, to prevent dislocation.

**AXIS,** IN BOTANY. See STEM.

**AXIS** (Lat. of unknown origin). A species of deer (*Cervus axis*) abundant throughout India and in many islands of the Eastern Archipelago. One of its Indian names is *chittra*, and by British sportsmen in India it is generally called the spotted hog deer. It was known to the ancients as *axis*. The axis resembles in size and color the European fallow deer; it is generally of a rich fawn color, beautifully spotted with white, nearly black along the back, the under parts snow-white. The horns are slender, sharp-pointed, little branched, and not at all palmated. The female has no horns. The axis frequents thick jungles in the vicinity of water and feeds during the night. It is commonly found in herds of 15 or 20, of which three or four are males. Its sense of smell is remarkably acute, and it is generally very shy and timid, so that sportsmen find it difficult to get within shot. The male, however, sometimes exhibits great courage in defense of the young. It is very easily domesticated, is gentle in its manners, and breeds freely in captivity, so that it is commonly seen in zoölogical parks. See Colored Plate of DEER.

**AX'LE** (Ger. *Achse[l]*, dim. of form found in Lat. *axis*). The bar of metal or wood which carries the wheel or wheels of vehicles or of machinery, and around which the wheel or wheels revolve, sometimes with the axle and sometimes upon it. Axles for wagons are made of iron, steel, or wood and are fixed, the wheels revolving around them. Axles of railway cars have the wheels keyed to them and revolve with the wheels, the ends of the axle projecting outside of the wheels, and turning in journal boxes on which the body of the car rests. Railway axles are forged from steel of high quality and have the wheels forced upon a taper wheel fit by hydraulic pressure. The projecting ends or journals are turned and finished smooth. Standard dimensions of axles for cars of different weights have been adopted in the United States by the American Master Car Builders' Association. See SHAFTING.

**AX-LES-THERMES,** åks'lā-tĕrm'. A town in the department of Ariège, France, on the Ariège River, about 20 miles southeast of Foix (Map: France, S., F 6). It is situated 2350 feet above sea level, and is a noted health resort because of its warm sulphur springs. There are over 60 of these, and the water is used for drinking and bathing purposes. Each of four bathing establishments is fed by a different group of springs. There is here a hospital founded for leprous soldiers in 1260. Pop., 1911, 1624.

**AX'MINSTER** (AS. *Axan Mynster*, minster of the [river] Axe). A market town in Devonshire, England, on the Axe, 24 miles east-northeast of Exeter (Map: England, D 6). Axminster was once famous for the manufacture of a superior grade of carpets. The industry has been removed to Salisbury, and the town has now numerous minor manufactories, an iron foundry, and lumber yards. Pop., 1901, 2906; 1911, 3009.

**AXOLOTL,** ăks'ō-lŏt'l (Mex.). Any of several species of larval salamanders of the genus Amblystoma. They inhabit certain lakes of Mexico and the Rocky Mountain region of the United States. Their eggs resemble frogs' eggs, being laid in strings formed by a viscous covering and attached to water plants. They hatch in from two to three weeks. The young axolotl has external bushy gills, much like those that are retained throughout life by the mud puppy (q.v.). It may become sexually mature while still bearing the external gills, and before its life history was known it had been given the name *Siredon lichenoides*. The passage of the axolotl into an Amblystoma first became known to science in 1865 and has since been confirmed. Recent experiments on captive specimens have shown that young axolotls can easily be made to change into the adult form if they are compelled to breathe air more frequently than usual, as when kept in vessels of shallow, poorly aërated water. This metamorphosis can be checked, the shrinking gills then undergoing fresh development, when they will remain axolotls indefinitely. Cutting off the gills produces no effect, as they are quickly renewed. The change involves the loss of the gills, the closing of the clefts, the disappearance of the back and tail fins, and the general broadening of the head. Perpetual submergence or a permanently dry saline shore prevents the transformation in nature, while it is favored by an alternation of wet and dry conditions, such as are found on a wave-washed shore or in slowly drying lakes or ponds. The Colorado form (*Axolotl tigrinum*) delays its metamorphosis for a long time, but it always occurs eventually in nature, while the black Mexican (*Axolotl maculatum*), which is much prized as food by the natives, has never been known to make the change.

**AX'STONE.** A variety of nephrite of greenish color, which is hard, tough, and more or less translucent. It is found in primitive rocks in Saxony, Greenland, New Zealand, and other South Pacific islands, and is used by the natives for making hatchets, whence its name.

**AXUM,** or **AKSUM,** åk-sōōm' (Gk. Ἄξουμις, *Aksoumis*, *Axoumis*, *Auxomis*, Lat. *Auxumis*). Once the capital of the Ethiopian kingdom of the same name, now capital of the modern Abyssinian province of Tigré, situated in lat. 14° 7′ N., and in long. 38° 43′ E. Even before the Christian Era Axum seems to have become the capital of an Ethiopian kingdom, whose chief port was Adule, about 100 miles distant, through which it carried on an extensive trade with Egypt and the Roman world. The kingdom

of the Axumites seems to have been gradually extended from the borders of Roman Egypt to the south, as far as the Straits of Bab-el-Mandeb, or even Cape Gardafui, and its kings claimed also dominion over the Homerites (or Himyarites) on the Arabian coast of the Red Sea. These kings were acquainted with Greek culture, as is shown by the inscriptions at Adule and Axum. One of those in the latter place was also written in the Geez language, sometimes called Ethiopic, but in the Sabæan characters used in southern Arabia. Christianity was introduced by Ædesius and Frumentius early in the fourth century, and in 356 A.D. the Emperor Constantius wrote to King Aizanes, asking his assistance against the teachings of Athanasius. The kingdom later lost its power and wealth with the advance of Mohammedanism, which gradually hemmed it in, though the country has always kept its Christian faith. Axum is regarded now as a sacred city by the Abyssinians, and still contains memorials of its greatness in a large number of curious obelisks connected, apparently, with Semitic sun worship, and the remains of an imposing Christian church. The population of the town at present is only about 5000. Consult: Dillmann, *Abhandlungen der Berliner Akademie* for 1879 and 1880; Mommsen, *Provinces of the Roman Empire*, vol. ii (Eng. trans., New York, 1886); Bent, *The Sacred City of the Ethiopians* (London, 1893); Glaser, *Geschichte Arabiens* (Berlin, 1885–90); id., *Die Abessinier in Arabien und Afrika* (Munich, 1895).

**AYACUCHO,** ä'yä-kōō'chō. A department of Peru, bounded by the department of Junin on the north, Cuzco and Apurimac on the east, Arequipa on the south, and Içа and Huancavelica on the west (Map: Peru, C 6). Area, 18,185 square miles. The surface is mountainous, well watered, and there are pasture lands on which sheep and cattle graze. The soil is well adapted for agricultural purposes and grain, coffee, cocoa, cacao, and cotton are produced. The precious metals, nickel, and cobalt, are mined and, with the chief agricultural products, are exported. Among the chief manufactures are spirituous liquors, hats, and flannel and leather goods. The latest official population figures are for 1896, when an estimate returned 302,469 for the department. Capital, Ayacucho (q.v.).

**AYACUCHO** (Indian, "corner of death," referring to a bloody battle once fought on this spot). An episcopal city, capital of the department of Ayacucho, Peru, situated 240 miles southeast of Lima, on a small tributary of the Mantaro River, 7900 feet above sea level (Map: Peru, C 6). The town is the seat of a university established in 1677. The surrounding district is chiefly devoted to cattle breeding and agriculture, an active trade in their products being carried on with Lima. The town manufactures wool, hats, and articles of silver. Pizarro founded the town in 1539, calling it San Juan de la Victoria de Guamanga, but the city has been called by its present name since 1825 to commemorate a great victory achieved by General Sucre over the Spaniards on Dec. 9, 1824, on the plateau of Ayacucho. This battle assured the independence of Peru. Pop., 1908, 14,346; 1912 (est.), 20,000.

**AYALA,** ä-yä'lä, Adelardo López de (1829–79). A Spanish poet and politician, born at Guadalcanal in Badajoz. He studied law at Seville, but later devoted himself to poetry. In behalf of the Revolution of 1868 he composed the Manifest of Cadiz, but on the restoration of the monarchy he reëstablished his relations with his former colleague, Canovas, and became Secretary of the Colonies in the first ministry of Alphonso XII. His writings include: *El hombre de estado* (1851); *Culpa y perdón* (1851); *Los dos Guymanes* (1851); *El tijado de vidrio* (1854); *El tanto por ciento* (1861); *Los comuneros; El nuevo Don Juan* (1863); *Consuelo* (1878). His "Obras completas" were published as the seventh volume of the *Colección de escritores Castellanos* (1881–87).

**AYALA,** Pedro López de. See López de Ayala, Pedro.

**AYAMONTE,** ä'yä-mōn'tā. A city of Andalusia, Spain, on the left bank of the Guadiana, near its mouth, where it forms the boundary between Spain and Portugal (Map: Spain, B 4). It is picturesquely situated on the slope and at the foot of a hill. The upper part of the town consists of narrow and irregular streets; those of the lower part are regular and wide. There are three public squares. The principal occupation of the inhabitants is fishing, shipbuilding, and coast trading. Pop., 1900, 7530; 1910, 9471.

**AYAPANA,** ä'yä-pä'nä. See Eupatorium.

**AYE-AYE,** äĭ'äĭ' (native Malagasy name; from its cry). A small, brownish, squirrel-like lemur (*Chiromys* or *Daubentonia madagascariensis*), of Madagascar, remarkable for its rodent-like dentition. It is the sole representative of its genus and of the family Chiromyidæ, which, with the family of the true lemurs, forms the sub-order Lemuroidea. It is arboreal and nocturnal in habits, living alone or in pairs in the bamboo jungle, constructing ball-like nests of dried leaves, and feeding on juicy vegetables, such as sugar cane, and upon the grubs of woodborers, to which its slender and curiously distorted fingers (see Plate of Axolotl and Aye-Aye) seem especially adapted. The fact that, until recently, this creature was considered upon the verge of extinction is due partly to its shy, nocturnal character, but chiefly to the superstitious veneration in which it is held by the natives, who object to capturing it. They think that if a person sleeps in the forest the aye-aye will bring him a pillow; if for the head, the person will become rich, if for the feet, he will succumb to the fatal power of the animal. Consult *Knowledge* (London, December, 1901) for an illustrated account of its characteristics.

**AYER,** âr. A town in Middlesex Co., Mass., 36 miles by rail west of Boston, on the Boston and Maine Railroad (Map: Massachusetts, D 3). It has a public library, tannery, saw mill, machine shop, and factories for vinegar and preserves. The water works are owned by the town. Pop., 1900, 2446; 1910, 2797.

**AYESHAH,** ä-yē'shä, or **AISHA,** ä'ē-shä. The favorite wife of Mohammed, and the daughter of Abu-Bekr. See Mohammed.

**AYLESBURY,** ālz'bĕr-ĭ. A market town and the county-seat of Buckinghamshire, England, about 38 miles northwest of London (Map: England, F 5). Aylesbury contains the only convict prison for women in England. It is chiefly an agricultural centre and has an industry in lace making and straw plaiting. Its ducks, raised for the London market, are justly famous. Pop., 1901, 9250; 1911, 11,048. Aylesbury is very ancient, having been taken from the Britons by the Saxons in 571.

**AYLESBURY.** A breed of large domestic white ducks. See Duck.

**AYLESFORD**, ālz'fẽrd. A village in Kent, England, picturesquely situated on the Medway, 39 miles southeast of London. Remarkable ancient remains occur here, comprising an extensive cromlech, or burying place, known as Kits-Coity, and, in the neighboring chalk hills, large circular sepulchral pits. Pop., 1911, 2569.

**AYLES'WORTH**, ālz'wûrth, SIR ALLEN BRISTOL (1854– ). A Canadian lawyer and statesman. He was born at Newburgh, Ontario, and was educated at Newburgh Academy and at Toronto University, where he graduated in 1874. He was called to the bar in 1878 and soon became prominent in the legal profession. His knowledge of electoral and constitutional law made him sought as counsel in many cases of public importance. Frequently he appeared in London before the Judicial Committee of the Privy Council, notably in 1904 in behalf of the old Provinces of Canada, when, as a result of the census of 1901, an effort was made to reduce their representation in the House of Commons. In 1903 he was appointed one of the two Canadian members of the Alaska Boundary Tribunal, and, with Sir Louis Amable Jetté, the other member, refused to sign the award of the Tribunal for reasons assigned in the minority report. (See ALASKA.) He was elected to the House of Commons in 1905, and in the same year became Postmaster-General in the cabinet of Sir Wilfrid Laurier. In 1906 he was appointed Minister of Justice, an office which he retained until 1911, when he retired from political life. In 1910 he rendered signal service as British agent in preparing the colonial case argued before The Hague Tribunal in the dispute between the United States and Great Britain regarding the Atlantic Fisheries. (See FISHING LAWS.) In 1911 he received the honor of knighthood.

**AYLLON**, ī-lyōn', LUCAS VASQUEZ DE (c. 1475–1526). A Spanish adventurer. He came to America, became a member of the Superior Court of Hispaniola (Santo Domingo) and in 1521 sent Gordillo to explore the coast of the present Florida. He himself visited James River and Chesapeake Bay in 1524 and, liking the country, applied for and received a grant to the surrounding territory from Charles V. In 1526 he brought about 600 colonists to the site of Jamestown, Va. (q.v.), and with the help of a large number of negro slaves, probably the first ever employed within the present limits of the United States, endeavored to build a town, which he called San Miguel. Before the end of the year, however, he died of fever, and his colony soon afterward was broken up by sickness, civil strife, and a negro insurrection. Many of the survivors were shipwrecked on their way back to Hispaniola, and only 150 reached their destination in safety. Consult Woodbury Lowery, *Spanish Settlements within the Present Limits of the United States, 1513–65* (New York, 1901).

**AYLMER**, āl'mẽr. The name of two Canadian lakes. 1. Lake Aylmer, 80 miles north of Great Slave Lake, is about 50 miles long by 30 miles broad (Map: British Columbia, H 2). 2. Lake Aylmer, in Wolfe Co., Quebec, lies 69 miles south of Quebec (Map: Quebec, G 5). Its outlet is the St. Francis River.

**AYLMER.** A village of Elgin Co., province of Ontario, Canada, situated on the Grand Trunk, Michigan Central, and Wabash railways, 12 miles east of St. Thomas (Map: Ontario, D 8). It lies in a productive farming and dairying district, and its manufacturing interests include saw and planing mills, shoe and leather factories, hoop and stave works, scale and pump works, a candy factory, foundries, and a condensed milk factory. Pop., 1911, 2102.

**AYLMER.** A village in Wright Co., province of Quebec, Canada, on Lake Deschaines, at the foot of steam navigation for the upper Ottawa, and on the Canadian Pacific Railway (Map: Quebec, C 5). It is a favorite summer resort, connected with Ottawa by an electric railway. Pop., 1901, 2291; 1911, 3109.

**AYLMER**, or ELMER, JOHN (1521–94). An English theologian. He was born at Aylmer Hall, Norfolk; graduated B.A. at Cambridge, 1541, and immediately thereafter became tutor to Lady Jane Grey. In June, 1553, he was made Archdeacon of Stow, but on Mary's accession, October, 1553, he fled the country lest his pronounced Protestantism should bring him into trouble, and lived on the Continent till Elizabeth's accession (1558). In 1562 he became Archdeacon of Lincoln, and in 1576 Bishop of London, in which position he showed a very arbitrary temper and was most unpopular. He died in London, June 3, 1594. His only literary production of note is his reply to John Knox's *Monstrous Regiment of Women*, entitled *An harborowe for faithfull and trewe subjects, against the late blowne blast concerning the government of women* (Strassburg, 1559). For his biography, consult J. Strype (new ed., Oxford, 1820).

**AYLMER**, MATTHEW, LORD (c.1643–1720). A British naval officer, born in the county of Meath, Ireland. He entered the navy in 1678 and served until 1688 on the Algerian coast and in the Mediterranean. At the battle of Beachy Head (1690) and at Barfleur (1692) he commanded the *Royal Katherine*. He was made rear-admiral in 1693, vice-admiral in 1694, and admiral in 1698. In the latter year he was sent to the Mediterranean to arrange the treaties with Tunis, Tripoli, and Algiers. He was commander-in-chief of the fleet from 1709 to 1711, and was suspended because of a dubious engagement, but was reinstated upon the accession of George I (1714).

**AYLOFFE**, ā'lŏf, SIR JOSEPH (1709–81). An eminent English antiquary. He attended St. John's College, Oxford, for a time and at an early age evinced considerable interest in antiquities. In 1731 he was elected a fellow of the Royal Society and in the following year a fellow of the Society of Antiquaries. In 1763 he was made one of the commissioners for the preservation of the state papers, and in 1772 published a valuable work entitled *Calendars of the Ancient Charters and of the Welsh and Scottish Rolls now Remaining in the Tower*. He also wrote several useful papers for the publications of the Society of Antiquaries and at the time of his death was engaged on the work known as Gough's *Sepulchral Monuments* (1799), which he had projected.

**AYMARÁ**, ī'mà-rä'. The name commonly applied to a former confederacy or group of semi-civilized tribes centring in the high plateau about Lake Titicaca, in Peru and Bolivia. They number now, including mixed bloods, more than half a million. At the time of the discovery they were subject to the Incas, but there is considerable ground for the opinion held by some writers that they are themselves the originators of the Inca (Quichua) civilization. Physically they

are distinguished for their great chest development, due to the rarefied air which they breathe. The mysterious cyclopean ruins of Tiahuanaco are within their territory and are probably, in part at least, of Aymará origin, as are possibly also other pre-Incan remains in southern Peru. Much light has been shed upon some of the problems of the Aymará region by the recent archæological and ethnological investigations, of Uhle and Bandelier (consult this author's *The Islands of Titicaca and Coati*, New York, 1910). The language constitutes a distinct linguistic stock, although considerably influenced by Quichua. Consult Middendorf, *Die Aimará-Sprache* (Leipzig, 1891) and Dorsey, *A Bibliography of the Anthropology of Peru* (Chicago, 1898).

**AYMON,** ā'mon. The surname of four brothers, called respectively Alard, Richard, Guichard, and Renaud, sons of Aymon, or Haimon, Count of Dordogne, who figure among the most illustrious heroes of the chivalric poetry of the Middle Ages. The story belongs to the cycle of romances in which Charlemagne is the central figure. Possibly Huon de Villeneuve, a French poet of the time of Philip Augustus (1180–1223), was the author of the poem entitled *Les quatre fils Aymon;* Ariosto later conferred poetical immortality on the family by the publication of his *Orlando Furioso*, in which Renaud, or Roland, the bravest of the four brothers, plays the most distinguished part. Caxton printed, about 1489, an English translation of the story, and in 1884–85 the Early English Text Society reprinted Caxton's work, under the title *The Four Sons of Aymon.* Tieck, the popular German writer, edited and published the story, but seems to have taken it from a different source. Consult Gautier, *Les Epopées françaises* (Paris, 1880), and Steele, *Renaud of Montauban and the four Sons of Aymon* (London, 1897). Also see ROLAND, THE SONG OF.

**AYR,** ār. A seaport, summer resort, and the county-town of Ayrshire, Scotland, situated on the Firth of Clyde, at the mouth of the river Ayr, 40 miles south-southwest of Glasgow by rail (Map: Scotland, D 4). Ayr is a clean and well-built town. It is connected by three bridges with the suburbs of Newton-on-Ayr and Wallacetown, which have constituted a part of the city since 1873. A harbor is formed by the estuary of the river and is protected by piers and a breakwater. In 1874 and succeeding years many improvements were added, including the construction of a large wet dock. Flannel, woolen, and leather goods, boots and shoes, and carpets are manufactured, and there are shipyards, lumber mills, and foundries. The coasting trade is considerable, exports including agricultural products, iron, and coal from the Ayrshire collieries, the latter being the most important. A considerable quantity of grain, timber, and manure is imported. At one time much wine was imported from France. The town has an excellent water supply, obtained from Loch Finlas. It owns and operates an electric light plant, and maintains an asylum, a hospital, industrial schools, markets, slaughter-houses, and a cemetery. The race course, owned by the town, is the scene of the "Western Meeting," held each year in September. Part of the tower of the old church of St. John, built in the twelfth century and turned into a fort by Cromwell, is still standing. The neighborhood of Ayr is rich in associations with the poet Robert Burns. About 2 miles to the south is the cottage in which he was born, and a little farther on Auld Alloway Kirk, and the Auld Brig of Doon of Tam o'Shanter fame. Near the river is the Burns Monument, in the style of a classic temple, containing relics of the poet and two excellent figures of Tam and Souter Johnny, by Thom, a native sculptor. Pop., 1901, 28,697; 1911, 32,986.

**AYRER,** ī'rĕr, JAKOB (c.1560–1605). A German dramatist. He was born at Nuremberg and, next to Hans Sachs, was the most prolific dramatic poet of the sixteenth century in Germany. He wrote, largely under the inspiration of English traveling comedians and in the interest of the Protestant Reformation, more than 100 plays between 1595 and 1605. The *Opus Theatricum* (Nuremberg, 1618) contains 30 of his tragedies and comedies and 36 of his Shrovetide plays and vaudevilles. They were sensational in their effects, coarse in language, pedantic sometimes in form, but they helped to turn the popular religious drama of the sixteenth century to the service of the new spiritual and national life. Consult: Keller, in *Bibliothek des litterarischen Vereins*, vol. lxxvi, and "Select Dramas of Jacob Ayrer," in *Deutsche Dichter des XVI. Jahrhunderts*, vol. clxxxvi, with a valuable introduction by Tittmann (Leipzig, 1868); also Th. Wolff, *Zur kenntnis der Quellen von J. Ayrers Schauspielen* (Berlin, 1875); J. G. Robertson, *Zur Kritik Jacob Ayrers* (Leipzig, 1892). Two of his dramas were translated into English by A. Cohn, *Shakespeare in Germany* (1885).

**AYRES,** ârz, ALFRED. See OSMUN, THOMAS EMBLEY.

**AYRES,** BROWN (1856– ). An American college president and scientist, born at Memphis, Tenn. After an early education obtained from private schools, he took engineering courses at Washington and Lee University and at the Stevens Institute of Technology. Following two years as a fellow of Johns Hopkins, he was appointed in 1880 professor of physics at Tulane University. This chair he held for 24 years, at various times acting also as dean of the College of Technology, dean of the academic department, and president pro tempore. In 1904 he was chosen president of the University of Tennessee. He became a member of many learned societies and in 1910 was president of the National Association of State Universities. Honorary degrees were conferred on him by several institutions.

**AYRES,** LEONARD PORTER (1879– ). An American educator, born at Niantic, Conn. He received his college and graduate training at Boston, Harvard, and Columbia universities. He began teaching in 1902 as one of the first to carry American ideas and methods to Porto Rico. There he was appointed superintendent of schools in the districts of Caguas and San Juan, and later general superintendent of all the public schools on the island. He was also chief of one of the Porto Rico summer school expeditions to the United States. Having returned to live in this country, he was made head of the division of statistics in the Playground Association of America. Beginning in 1908, he became prominently identified with the work of the Russell Sage Foundation, especially as chairman of the committee in charge of the Backward Children Investigation. In 1908–09 he lectured on education at New York University. His writings on educational subjects, besides reports and contributions to periodicals, are: *A Course of Study for*

*the Schools of San Juan* (1905); *Medical Inspection of Schools*, with Luther H. Gulick (1908); *Laggards in our Schools* (1909, 1913); *Open Air Schools* (1910); *Seven Great Foundations* (1911); very many of his articles in educational journals have been reprinted, among them, *The Effect of Promotion Rate on School Efficiency* (1913).

**AYRES,** ROMEYN BECK (1825–88). An American soldier. He was born in Montgomery Co., N. Y., graduated at West Point in 1847, and was at once attached to the artillery in the Mexican War. He became a captain in 1861, took part in the first battle of Bull Run, and was chief of artillery in Gen. W. F. Smith's division from October, 1861, to November, 1862, and of the Sixth Army Corps from November, 1862, to April, 1863. He served with the Army of the Potomac in the Peninsular Campaign, and afterward in the battles of South Mountain, Antietam, Fredericksburg, Chancellorsville (where he commanded a brigade), and Gettysburg (where he commanded a division of the Fifth Army Corps). In August, 1863, his division was ordered to New York to aid in suppressing the draft riots. General Ayres afterward took a prominent part in Grant's Richmond campaign, was wounded at the siege of Petersburg, and from August, 1865, to April, 1866, when he was mustered out of the volunteer service, was in command of the Shenandoah valley. At the close of the war he was brevetted brigadier-general and major-general in both the volunteer and the regular service, and afterward, until his death, served on garrison duty as lieutenant-colonel and colonel in the regular army at various military stations.

**AYR'SHIRE,** ār'shēr. A maritime county in the southwestern division of Scotland, bounded north by Renfrewshire, west by the Firth of Clyde and the North Channel, south by Wigton and Kirkcudbright, east and northeast by Dumfries and Lanark (Map: Scotland, D 4). Area, 1132 square miles. The county is undulating and hilly, the land attaining no great elevation, except a small portion in the north and some considerable tracts in the south and southeast, which are mountainous. It is rich in valuable minerals, especially coal, ironstone, limestone, and freestone, and one-fifth of the population are engaged in the mining industry. Agriculture is in an advanced state, and dairy husbandry is carried to high perfection, the breed of milch cows, of which it rears a great number, are highly esteemed in the kingdom for the quantity and quality of their milk. (For illustration, see Plate of DAIRY CATTLE under CATTLE.) The breed of horses is also excellent. Among the leading manufactures are iron, textiles, and lace. There are valuable fisheries and shipyards on some parts of the coast. The most important towns are Kilmarnock, Stevenston, Ardrossan, Dundonald, and Ayr, the capital. Pop., 1801, 84,200; 1851, 189,860; 1891, 226,386; 1901, 254,400; 1911, 268,337. Consult Paterson, *History of Ayrshire* (Edinburgh, 1863–66).

**AYRTON,** ār'ton, WILLIAM EDWARD (1847–1908). An English physicist and electrical engineer, born in London. After finishing his course at the University College, London, he was appointed to the telegraph service of the Indian government (1868), and in 1873–79 was professor of natural philosophy and telegraphy in the Imperial College of Engineering at Tokio, Japan. In 1879 he was appointed professor of applied physics in the City and Guilds of London Institute, South Kensington, and in 1904 he became dean of the Central Technical College, after 20 years of service there as professor of electrical engineering. He was at various times president of the Mathematics and Physics Section of the British Association, of the Physical Society, and of the Institution of Electrical Engineers. With Professor Perry he invented an ammeter, voltmeter, electric power meter, etc. His works include *Practical Electricity* (rev. ed., 1911).

**AYSCUE,** āsˈkū, SIR GEORGE (?–1671). An English admiral. He was knighted by Charles I, but held no command until 1646. Two years later, the neutrality which the navy had preserved while the Civil War raged on land terminated, and a large part of the fleet set sail for Holland. It was chiefly the influence of Ayscue, who sided with Parliament, that prevented the remainder of the fleet from leaving the English coast, and his services were rewarded by an appointment as admiral. In this capacity he reduced Barbadoes (after a stubborn resistance by the Royalist Governor, Willoughby), Antigua, Nevis, St. Christopher, and the settlements on the Virginia coast (1651). During the following years he was engaged in repeated naval conflicts with the Dutch under Tromp and Ruyter. In 1666 his flagship, the *Royal Prince*, ran aground and was captured. He himself was seized and carried to Holland, where he was paraded through the towns and exhibited to the populace. He returned to England in 1667.

**AYSHA.** See AYESHAH.

**AYTON,** āˈton, SIR ROBERT (1570–1638). A Scottish poet. He was born at the castle of Kinaldie, Fifeshire, and was educated at St. Andrews, where he took the degree of M.A. in 1588. From France, where he went for study, he addressed, in 1603, a panegyric in Latin hexameters to James I. This poem, intended for a somewhat pedantic king, was the making of Ayton's fortune, for he was soon appointed one of the gentlemen of the bedchamber and private secretary to the Queen. These honors were continued by Charles I. Ayton was on terms of familiarity with the most eminent men of his time, poets, wits, and philosophers alike, among them Hobbes and Ben Jonson. He was a poet of slight merit. He has, however, the distinction of being one of the first Scotchmen to write in the English of the court. To him have been without good evidence attributed the originals of two songs by Burns, one of which is "Auld Lang Syne." He died in Whitehall Palace in 1638. Consult Rogers, *Poems*, with memoir (Edinburgh, 1871).

**AYTOUN,** āˈtōōn, WILLIAM EDMONSTOUNE (1813–65). A Scottish poet, born in Edinburgh, June 21, 1813. He received his education at the university there, and was called to the Scottish bar in 1840. In 1845 he was appointed professor of rhetoric and belles-lettres in the University of Edinburgh, and after the formation of the Derby ministry in 1852 he was promoted to the shrievalty of Orkney. He married a daughter of John Wilson. During many years Aytoun devoted himself to literary work. His first important work was *The Life and Times of Richard I* (1840)—a subject well treated and singularly in consonance with his romantic na-

ture. He was also a master of caricature and parody, and many of the *Bon Gaultier Ballads* were from his pen. In 1848 he published the popular *Lays of the Scottish Cavaliers and Other Poems*, which established his reputation as a poet of the school of Scott, and were regarded as offsetting the Puritan ballad poetry of Macaulay. Among his subsequent writings are: *Firmilian: A Spasmodic Tragedy* (1854), and *Bothwell* (1856), a narrative poem of considerable length, in the measure and manner of Scott. His edition of the *Scottish Ballads* (2 vols.) appeared in 1858. In the following year he issued, in conjunction with Sir Theodore Martin, translations of various minor poems of Goethe. He was for many years one of the most frequent and brilliant contributors to *Blackwood's Magazine*. Aytoun was distinguished at once as poet and humorist. His poems exhibit a ballad-like simplicity and a fiery flow of narration, while his tales—the best known and appreciated of which are *The Glenmutchkin Railway* and *How I Became a Yeoman*—possess a certain robust humor and farcical abandonment which made them widely popular. Aytoun died Aug. 4, 1865. His life was written by Sir Theodore Martin (London, 1867).

**AYUB KHAN,** ī'yo͞ob'kän (1855– ). The youngest son of Shere Ali, Ameer of Afghanistan. He was Governor of Herat under his father and his brother, Yakub. After Yakub's abdication he actively opposed the English, and on July 27, 1880, he overwhelmed General Burrows's command at Kushk-i-Nakhud, after which he laid siege to Kandahar. General Roberts hastened from Kabul, performing a memorable march, to relieve Kandahar, and on September 1 dispersed the forces of Ayub Khan, who fell back on Herat. In 1881 Ayub Khan captured Kandahar, but he was unable to maintain himself against the new Ameer, Abd-ur-Rahman. After the loss of Herat he went to Persia, where he was under the espionage of the Persian government, acting for the English. During the insurrection of the Ghilzais, in 1887, he formed a conspiracy to capture Herat, but was detected and again driven into exile. Becoming dissatisfied with his wandering existence in Persia, he at last handed himself over to the British agent at Meshed, whereupon the government provided for him as a state prisoner at Rawal-Pindi, in the Punjab.

**AYUNTAMIENTO,** ä-yo͞on'tä-myän'tō (Sp. from *yuntar*, Lat. *iungere*, to join; cf. *junta*). The name given to communal councils in Spain. Villages of less than 30 inhabitants combine with others of the neighborhood and elect a common council; its number varies from 4 to 48, depending on the size and importance of the community; the members are elected by manhood suffrage and hold office for four years. Every two years the terms of half the members expire. They choose from among their number the *Alcalde*, or mayor, and his subordinates the *tenientes* and control the disbursal of communal revenues as well as the direction of all purely municipal affairs. As a rule, the councils are not free from the interference of the central government. The Ayuntamiento is a very ancient institution, probably dating from Roman times. It gained great prominence in the wars against the Moors, but after an unsuccessful uprising against Charles I in 1521, it lost most of its powers. These were further curtailed under the Bourbons, and in 1815 they were abolished by Ferdinand VIII, only to be reëstablished by the Cortes in 1821. For the next 50 years their power varied with the party in power, but in 1877 they assumed the position which they occupy to-day.

**AYUTHIA,** ä-yo͞ot'hē-ä. A city of Siam on an island in the Menam, about 45 miles north of Bangkok (Map: Siam, D 4). The river is broken up into a network of creeks to whose banks are moored the floating houses in which most of the inhabitants live. Pop., about 50,000. Ayuthia is the chief town of the important agricultural monthon (circle or division) of Krung-Kao and is situated on the main line of the state railway. Its trade consists chiefly in large shipments of paddy to Bangkok and imports therefrom of clothing and other supplies. Founded in 1351, it was the capital of Siam until 1767. The old city is now largely in ruins, which possess great archæological interest; overgrown with vegetation may be discerned bronze statues, sculptured masses, and the remains of palaces, pagodas, temples, and fortifications. In the days of its glory it was 9 miles in circumference, and within its walls were different quarters, in which dwelt foreigners, who came for trade from many countries—Chinese, Malays, Portuguese, Japanese, and various Asiatics. The most conspicuous structure, built in the form of a pyramid and surmounted by a domed spire, is called the "Golden Mount." Ayuthia was destroyed by the Burmese in 1555 and again in 1767. It was also the scene of the missionary labors of the Portuguese, and of a bloody battle between the Dutch and the English—one of the incidents which led to the naval wars of the seventeenth century.

**AYVAZOVSKI,** ī'vä-zŏf'skĕ, Ivan Konstantinovitch. See Aivazovski.

**AYYUB IBN SHADI,** äy-yo͞ob' 'b'n shä'dē (?–1173). The father of Saladin. He was a Kurd and a member of the tribe of Rawadiya. With his two sons he went to Bagdad and thence to Tikrit, which he made his home, and where his body lies in an elaborate tomb surmounted by a cupola. He won high military rank in Syria and Mesopotamia and lived to see his famous son subjugate the Fatimides and establish the Ayyubid Dynasty in Egypt and Syria. This dynasty was called after him, as that established by Muawiya was named after Ummaya and the one founded by Ibrahim ibn al Aghlab was called the Aghlabid Dynasty. That Ayyub, who came with other members of the family to Egypt after Saladin had overthrown the last Fatimid ruler, exercised considerable influence, is shown by the story Ibn Athir tells concerning his public advice in the council to submit to Nureddin, and his private counsel to his son afterward to resist the ruler of Aleppo. See Nureddin-Mahmud.

**AZA'LEA** (Gk. *ἀζαλέος, azaleos*, dry, so called because supposed to grow best in dry ground). A genus of plants belonging to the family Ericaceæ (heath family). Some botanists unite the genus *Azalea* to *Rhododendron*. One of the species best deserving of notice is *Azalea pontica*, a shrub from 3 to 5 feet high, a native of the countries around the Black Sea, with large obovate or oblong, lanceolate shining leaves and umbellate yellow flowers, which are externally covered with glutinous hairy glands

# AZALEAS & RHODODENDRONS




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1 WILD HONEYSUCKLE-PINXTER FLOWER-AZALEA NUDIFLORA
2 FLAME AZALEA-AZALEA CALENDULACEA
3 GREAT LAUREL-ROSE BAY-RHODODENDRON MAXIMUM
4 MOUNTAIN ROSE BAY-RHODODENDRON CATAWBIENSE

and are very fragrant. It covers many mountain slopes, but does not ascend to great elevations, giving place to the more alpine *Rhododendron ponticum*. It is common in gardens and shrubberies in Great Britain, and varies with orange, red, and almost white flowers. The whole plant is narcotic and poisonous. North America abounds in azaleas as well as in rhododendrons, and some of the species have been long cultivated in Great Britain, particularly *Azalea nudiflora* and *Azalea viscosa*, which, with *Azalea pontica*, have become the parents of many hybrids. The former has pink, the latter pure white flowers, of delightful fragrance. *Azalea viscosa* has the flowers covered with glutinous hairs like *Azalea pontica;* but the flowers of *Azalea nudiflora* are nearly destitute of them. Both species abound from Canada to the southern parts of the United States (the latter is sometimes known by the common name of honeysuckle). *Azalea arborescens*, a mountainous species, from 3 to 10 feet high, has large rose-colored flowers. *Azalea calendulacea*, a native of the southern parts of the United States, is described as frequently clothing the mountains with a robe of living scarlet. India and China produce several species of azalea, of which one of the finest is *Azalea indica*, well known as a greenhouse shrub. Its flowers exhibit great brilliancy of colors. Many hybrids exist between it and the more hardy species. Another extremely beautiful species is *Azalea liliflora*, an evergreen introduced from China. The wholesale propagation of azalea plants for winter forcing in greenhouses is an important industry in Holland, Belgium, and parts of Germany.

**AZANA.** See AIZANI.

**AZANCHEVSKY,** ä'zän-chyĕf'skĕ, MICHAEL VON (1839–81). A Russian composer. He was born in Moscow, studied under Richter and Hauptmann at Leipzig, and was director of the Conservatory at St. Petersburg from 1870 to 1876. He was the owner of a noteworthy musical library and was an acknowledged authority in general music. Among his many compositions are a *Sonata in B Minor* for pianoforte and violoncello; a *Fest Polonaise*, for two pianofortes; two trios; two quartets; the Twelfth Psalm; and a concert overture.

**AZARA,** ä-thä'rä, FELIX DE (1746–1811). A Spanish soldier, naturalist, and traveler. He was born at Barbuñales, in Aragon, was educated at the universities of Huesca and Barcelona, obtained a commission in the Spanish army, and rose to the rank of brigadier-general. He was severely wounded in the attack upon Algiers. In 1781 he was appointed one of the commissioners for fixing the boundaries of the Spanish and Portuguese possessions in South America. He did not return to Spain till 1801, when he published an account of his travels in his *Voyage dans l'Amérique méridionale* (1809), and an important work on quadrupeds and birds, under the modest title of *Notes on the Natural History of Paraguay and La Plata* (1802). His *Geografía Física y Esférica de las provincias del Paraguay y Misiones guaraníes*, composed in 1790, remained inedited in the National Library of Montevideo until published by Dr. R. R. Schuller in 1904. Consult also Luís María Torres, *Les études géographiques et historiques de Félix d'Azara* (Buenos Ayres, 1905).

**AZARA,** JOSÉ, NICOLÁS DE (1731–1804). A Spanish diplomat, born at Barbuñales, Aragon, a brother of Felix de Azara. He studied at the universities of Huesca and Salamanca, and in 1765 was appointed Spanish envoy at the papal court. Here he exercised a very considerable influence, and was concerned with the suppression of the Jesuit Order in 1773 and with the election of Pius VI. Subsequently he was sent on missions to Paris and Barcelona. He was known as a patron of art, edited the works of his friend Mengs, with a biography (1780), and translated (1792) Middleton's *Life of Cicero*. Consult Paul Besques, "La première ambassade de D. José Nicolas de Azara à Paris (mars, 1798–août, 1799)" in *Bulletin hispanique*, vol. iii (1901). Consult also J. Gómez de Arteche, "Reinado de Carlos IV," in the *Historia General de España*, published by the Royal Academy of History (Madrid, 1892).

**AZARA'S DOG** (or **FOX**). See FOX-DOG.

**AZ'ARI'AH** (Heb. Yahwe helps). The name of a number of biblical personages, no less than 24 being found. (1) One of these is Azariah the son of Oded, a prophet who, by his exhortation of Asa, King of Judah, is said to have brought about a religious reform (2 Chron. xv. 1–8). Of the same name were at least four high priests at various times, living (2) in the reign of Solomon (1 Kings iv. 2); (3) in the reign of Asa (1 Chron. vi. 10); (4) in the reign of Uzziah (2 Chron. xxvi. 16–20); (5) in the reign of Hezekiah (2 Chron. xxxi. 10). (6) Azariah, of the tribe of Ephraim, was one of four who sided with the prophet Oded when he preached against the Israelites for attempting to make captives of Judah (2 Chron. xxviii. 12). (7) Azariah is the name most frequently used in Kings of Uzziah (q.v.). (8) Azariah, also called Abednego, was one of the three men thrown into the fiery furnace (Dan. i. 11). In addition to these persons mentioned in the Bible, the Assyrian King Tiglath-pileser IV (745–728) refers in an inscription to an Azriyau or Azariah of Yaudi who was long supposed to be identical with the King of Judah known also as Uzziah. It is now held, however, by most scholars that this Azariah ruled over the N. Syrian Yaudi known to us through the Zenjirli inscriptions.

**AZAROLE,** ăz'ä-rōl. See CRATÆGUS.

**AZAZEL,** ăz'ä-zĕl'. A name occurring in connection with the services on the Day of Atonement (Lev. xvi. 8, 10, 26). Two goats were taken by the high priest, one of which was slaughtered, and the other, after the sins of all Israel had been confessed over its head, was led out by some one to the wilderness and thrown over the rocks. The symbolism conveyed by the act is evident. All the sins of the people were handed over to Azazel. This name appears in later writings as the chief of the angels who married human beings and begat of them wicked men (Gen. vi.). In Enoch x. 8 Azazel causes all sin; in lxix, 2 he appears as the last of the 21 angels; in the Sibylline Oracles, ii, 215, the same angel is referred to as Azael. The name means 'God is strong.' Azazel was bound by angels and laid in the desert, at a place, Dudael, identified by Schick with Bet-hudedun, a chalky cliff near Jerusalem, to await his punishment. It appears that the rite of Azazel is a remnant of an ancient demon-worship, which was changed and modified for the purposes of the Levitical writers.

**AZCARRAGA Y PALMERO,** äth'kä-rä'gä ē päl-mā'rō, MARCELO DE (1832– ). A Span-

ish general and statesman, born in Manila. He received a military education at Madrid, and participated in the movement which established Alfonso XII on the throne (1874). As Under Secretary in the Ministry of War he distinguished himself by his admirable organization of the Cuban forces. He became lieutenant-general, and after sitting in the first Chamber of Deputies under Alfonso XII was made a life Senator. He was Minister of War under Cánovas del Castillo in 1890–92 and 1895–97 and after the assassination of Cánovas in the latter year (August 8) was head of the cabinet till September 30. He was Minister of War under Silvela in 1899–1900, and Premier again from October of the latter year till February, 1901, and from December, 1904, to January, 1905. In 1909 he was President of the Senate. In 1871 he wrote *La libertad de comercio en las Islas Filipinas*, followed by other books on the subject of Spanish colonies. He was admitted to the Order of the Golden Fleece, received the collar of the Order of Carlos III, and was made a Knight Grand Cross of several other Spanish and foreign orders.

**AZEGLIO,** ȧd-zā'lyō, MASSIMO TAPARELLI, MARCHESE D' (1798–1866). An Italian statesman, author, and artist, the descendant of an ancient and noble Piedmontese family. He early went to Rome and devoted himself to art, winning a reputation in landscape and historical painting. After his father's death, in 1830, he went to Milan and married a daughter of Manzoni. Soon afterward he made his début in literature with the richly colored patriotic novels *Ettore Fieramosca* (1833) and *Niccolò de' Lapi* (1841); Fanfulla, one of D'Azeglio's burlesque characters, has become a proverbial type in Italy. The political affairs of Italy called forth his famous attack upon the papal government, *Degli ultimi casi di Romagna*, in which he urged upon the Italian princes the necessity of a national policy. After the election of Pope Pius IX, D'Azeglio went to Rome, and to him are to some extent ascribed the reforms with which Pius began his government. In the excitement that preceded 1848, he published *Il lutto di Lombardia*, and later took part in the campaign against Austria, both in Lombardy and in Venetia, and was severely wounded at the battle of Vicenza. He felt bitterly the failure of this war and vented his feelings in many polemical articles. On the opening of the Sardinian Parliament he was chosen a member of the Chamber of Deputies, and, after the unfortunate battle of Novara, March 23, 1849, was intrusted by Victor Emmanuel II with the task of forming a ministry. His careful and shrewd policy, especially toward France, dubbed by his enemies that of *playing 'possum* (*far il morto*) won him at the time as many enemies as later it gained him admirers. His unpopularity led in 1852 to the succession of Cavour, who was supported with great loyalty by D'Azeglio, in various foreign posts and with personal advice. At the close of the war, in 1859, D'Azeglio was appointed pro tempore general and commissioner extraordinary (purely military) for the Roman States. D'Azeglio's spiritual evolution has been discerningly outlined by De Sanctis in *Nuovi saggi critici* (Naples, 1898). A character noted for its poise and disinterestedness, D'Azeglio believed that Italian liberty must be accomplished by a series of orderly and progressive steps, for which he worked with a moderation equaled only by his tenacity. He distrusted the more radical notions of the revolutionists and centred his whole policy simply on the expulsion of the foreigner. When independence was accomplished, he felt that his own work was done. He has left a charming story of his own life in *I miei ricordi* (Florence, 1873). Since his death, *L'Italie de 1847 à 1865; correspondance politique de Massimo d'Azeglio* (1866), and other writings have appeared. Consult other biographies by Camerini (Turin, 1861); Giuliani (Florence, 1866); Massari (Turin, 1867); Morozzo (Florence, 1884); also Vismara, *Bibliografia di Massimo d'Azeglio* (Milan, 1878); Déjob, *Un homme d'état spirituel et chevaleresque* (Paris, 1894); and Constance D'Azeglio, *Souvenirs historiques de M. D'A.* (Turin, 1884). Translations: *Ettore Fieramosca, The Challenge of Barletta* (anon., New York, 1850); ib., by C. E. Lester (New York, 1845); *Ricordi*, by Maffei (London, 1868), and in Warner's *Library of the World's Best Literature; Niccolò de' Lapi*, by H. Hallet (New York, 1860).

**AZERBAIJAN,** ä'zĕr-bī-jän' (anciently, *Atropatene*). (See ATROPATENE.) The most northerly province of Persia, bounded on the south by Persian Kurdistan and Irak, east by Ghilan and the Caspian Sea, north by Russian Armenia, and west by Turkish Armenia and Turkish Kurdistan (Map: Persia, B 2). It has an area of about 40,000 square miles. The surface of Azerbaijan is very mountainous, many of the ranges rising from 7000 to 9000 feet in height. The peak of Savalan (an extinct volcano) reaches an elevation of 13,000 feet. Mount Ararat rises on the northwest border. The chief rivers are the Aras or Araxes, Kara-Su, and the Kizil-Uzen. The salt lake Urumiah, the largest in Persia, is situated in the western part of the province. The climate is not unhealthful, but is very unsteady. The principal products are grain, fruit, flax, hemp, cotton, tobacco, honey, and saffron. The province is very rich in minerals, and especially in marbles. Silver, lead, tin, copper, iron, coal, and oil are found. The population of the province is estimated between 1,500,000 and 2,000,000. The bulk of the natives are physically of the type of the Persians of the Teheran-Ispahan country, but speak a dialect of Turkish. The capital is Tabriz. For further description, see CAUCASIAN; TATARS.

**AZEVEDO,** ä'zā-vā'dō, MANOEL ANTONIO ALVARES DE (1831–52). A Brazilian poet, born at São Paulo. He studied law at the university there, and afterward published a volume of poems entitled *Lyra dos vinte annos* (5th ed., 1884), which consists chiefly of elegies and displays a high degree of talent. His *Obras* were first published in 1853; the *Obras completas* which appeared in three volumes in 1863, include, besides poems, a biographical notice by J. Monteiro, prose writings, and the dramatic sketches *Bohemios*, *Macario*, and *Noite na taverna*. Consult F. Wolf, *Le Brésil littéraire* (Berlin, 1863).

**AZEVEDO Y ZUNIGA,** ä'thā-vā'dō ē thōō'-nyē-gȧ, GASPARD DE, COUNT OF MONTEREY (1540–1606). Viceroy of Mexico and Peru (1595–1603). He sent out several expeditions in California and New Mexico for exploration and settlement. Monterey, founded in 1596, and the Bay of Monterey, were named in his honor.

**AZILIAN.** See PALEOLITHIC PERIOD.

**AZIMUTH** (Fr. *azimut*, from Ar. *as-sumut*, a way, or point in the horizon). In astronomy,

the azimuth of a heavenly body is the angle measured along the horizon between the north or south point, and the point where a circle passing through the zenith and the body cuts the horizon. Astronomers usually measure astronomical azimuth westward from the beginning at 0°, and returning to it at 360°. Thus, in northern latitudes, where the north pole is elevated, the azimuth is measured from the south point, so that the east point, for instance, has an azimuth of 270°. Navigators and surveyors generally reckon azimuth from the nearest principal point of the compass. Thus, W. 24° S. would mean an azimuth 24° from west in the direction of south; and astronomically this would be simply 66°. See AMPLITUDE.

**AZINCOURT,** ȧ′zăn′kōōr′. See AGINCOURT.

**AZ′OBEN′ZENE,** $C_6H_5.N=N.C_6H_5$. A valuable compound of carbon, hydrogen, and nitrogen. It is a red, crystalline substance, insoluble in water, but soluble in alcohol or in ether. When pure, it melts at 68° C. and boils, without being decomposed, at 293° C. It may be prepared by treating nitro-benzene with a solution of stannous chloride in soda, the precipitate thus produced being washed with water and recrystallized from petroleum-ether. By the reducing action of tin and concentrated hydrochloric acid, azobenzene is converted into the substance called benzidine ($NH_2.C_6H_4.C_6H_4.NH_2$), which is extensively used in making the so-called azo dyes. See COAL-TAR COLORS.

**AZ′O COL′ORS.** See COAL-TAR COLORS.

**AZOIC,** ȧ-zō′ĭk (Gk. *ἄζωος, azōos,* lifeless, from *ȧ, a,* priv. + *ζωή, zōē,* life). A name applied by Sir Roderick Murchison, in 1845, to the old crystalline rocks of the Scandinavian Peninsula, in recognition of the fact that they contain no traces of organic life. Later the name was adopted by both European and American geologists to designate similar rocks that lie at the bottom of the geological column beneath all the fossiliferous rocks of the earth's crust. Eventually a conflict arose between the advocates of the name "azoic" and those who preferred the term "primitive," the conflict being over the theories of origin involved in these names rather than in the use of the names themselves. With a view to terminating this discussion, J. D. Dana proposed, in 1872, the name "archæan," thus avoiding all theory of origin, with the result that the terms "azoic" and "primitive" shortly ceased to be applied by the leading geologists to rock formations. Azoic is, however, still employed in another sense (Dana's *Manual of Geology,* 4th ed., New York, 1896, p. 440), being applied to the second "æon" or great period of time, without organic life, through which the earth passed before the advent of those conditions that permitted the growth of living matter. Rocks of this æon have not as yet been definitely recognized in the earth's crust. For the description of the rocks originally considered as azoic, the reader is referred to the article on PRE-CAMBRIAN FORMATIONS; also to ALGONKIAN SYSTEM; and ARCHÆAN SYSTEM.

**AZORES,** ȧ-zōrz′ (Portug. *Açores,* so called from *açores,* hawks, found there). A group of islands in the Atlantic Ocean, whose nearest point is 830 miles west of Portugal, to which they belong (Map: Africa, B 1). They extend over 400 miles from about lat. 37° to 40° N. and from long. 25° to 31° 16′ W. and occupy an area of 922 square miles. Excluding the uninhabited reefs, the group numbers nine islands, divided into three sub-groups—the southeastern, consisting of the islands of São Miguel, or St. Michael's (297 square miles), and Santa Maria, with Formigas (40 square miles); the central group, embracing the islands of Pico (176 square miles), Terceira (223 square miles), São Jorge (40 square miles), Fayal (64 square miles), and Graciosa (18 square miles); and the northwestern group, consisting of Flores (57 square miles) and Corvo (7 square miles). The entire archipelago is of volcanic origin and very mountainous, the highest volcanic summit being Pico Alto (7612 feet) on the island of Pico. The volcanic origin of the islands is shown by the large number of hot springs scattered all over the group, and by the earthquakes from which the islands have suffered even in comparatively recent times. Streams are abundant. The climate is mild, and snow is seldom seen. The highest temperature is about 86°, but the humidity is often excessive. The islands are popular as a winter resort. The flora resembles that of Spain; of the 478 species found in the islands, 400 are of European origin. The native fauna is limited to the bat and several rodents.

The soil is very fertile, and the mild climate allows of the cultivation of tropical fruits, such as olives, oranges, grapes, and bananas. Agriculture is greatly impeded by the unequal distribution of land, and the emigration of the landless population to British Guiana, West Indies, and South America is steadily increasing. A considerable trade in fruit is carried on with Portugal, England, Brazil, and North America. Oranges, formerly the chief article of export, are now gradually being replaced by pineapples. Imports come chiefly from Great Britain. There are only a few safe harbors, the chief among which is that of Angra, the capital of the archipelago, on the island of Terceira. Administratively the archipelago is considered a province of Portugal and is divided into the three districts of Angra do Heroismo, Horta, and Ponta Delgada. The population (242,613 in 1911) is mainly of Portuguese origin with Moorish and Flemish admixtures. The remainder are negroes, mulattoes, and some settlers from Great Britain.

The discovery of Phœnician coins on the Island of Corvo would indicate that the Azores were visited by Carthaginian traders. They appear on the maps of the mediæval Arabian geographers, and on an Italian map of 1351. They were occupied by the Portuguese under Gonçalo Velho Cabral and others between 1431 and 1461 and were, before that time, uninhabited. In 1466 Alfonso V made a life grant of the island of Fayal to his aunt, the Duchess of Burgundy, and from this circumstance many settlers migrated thither from Flanders. During the next century the islands became a favorite stopping place for the Spanish fleets on their return from America, and in the neighboring waters several sharp encounters took place between the Spaniards and the English sea-rovers. Consult Ray, *The Azores* (Washington, 1892); Brown, *Madeira, Canary Islands and Azores* (Madeira, 1910).

**AZ′OTH** (Ar. *al,* the + *zāūg,* Pers. *zhīwah,* quicksilver). The panacea of Paracelsus, regarded by his followers as "the tincture of life." See PARACELSUS.

**AZ′OTIN** (Fr. *azote,* nitrogen, from Gk. *ȧ, a,* priv. + *ζῆν, zēn,* to live). A nitrogenous

fertilizer prepared from meat refuse, practically identical with ammonite. See MANURES and MANURING.

**AZ'OTU'RIA.** A disease of the horse, also known as azotemia, hemoglobinemia, hemoglobinuria, etc. It is characterized by the loss of control of the hind limbs and the passage of ropy, dark, or coffee-colored urine.

The disease almost always occurs in horses which have rested for a day or more, during which time they have been kept on full rations. It is never seen at pasture and rarely under constant work, though the feeding be high. The attack is usually precipitated by taking the horse from the stable and subjecting it to exercise or work. Usually after being driven for half a mile or more the horse suddenly commences to stagger in the hind parts, the feet being raised only slightly from the ground, it knuckles at the pastern, perspires profusely, finally collapses, and cannot get up. When down, the body and limbs are moved convulsively, the pulse and breathing are accelerated, the excitement causes the temperature to rise to 102°–103° F. and the mucous membranes are congested.

The disease can be diagnosed with certainty only by the presence of its two cardinal symptoms: (1) the peculiar muscular affection, and (2) the hemoglobinuria. The affection may be mistaken for spinal meningitis, colic, and fractures, from which it must be differentiated.

While there are several theories as to the cause of the disease, the most tenable seems to be that of an autointoxication. It is believed that, during the functioning of previously rested muscles or in muscles which have worked to excessive exertion, some substance is formed which exerts a toxic action.

The affected animals are generally very uneasy, and in order to prevent further injury to the head and feet chloral hydrate is administered to quiet them. The disease may end fatally in a few hours or days, or recovery may follow, being usually more speedy and perfect if it has set in at an early stage.

Remedial measures which have been recommended include venesection, followed by the injection of a normal salt solution, administration of cathartics, cardiac stimulants, potassium iodide, fomentations of warm water over the loins, electricity to the affected muscles, etc. Attacks may be prevented by regular work or exercise and by the reduction of the grain feed when at rest.

**AZO'TUS.** Same as Ashdod (q.v.).

**AZOV,** ȧ'zŏf. A fortified town and seaport in the Russian territory of the Don Cossacks, on the left bank of the river Don, about 25 miles east of Rostov, and within 5 or 6 miles of the Sea of Azov (Map: Russia, G 5). The principal industries are fishing and gardening. It carries on an extensive trade in grain, serving as an outlet for the southeastern part of Russia. Pop., in 1885, 16,600; in 1913, about 27,000. The flourishing trading colony of the Greeks, Tanaïs, on or very near the present site of Azov, was conquered by Mithridates (115 B.C.). Then it fell under the successive rule of the Sarmatians, Huns, Khazars, and the Petchenegs. In the tenth century it was captured by the Russian prince Vladimir I. When in the thirteenth century it was taken by the Genoese, Azov became the commercial centre and entrepôt for the Indo-Chinese trade, and the Genoese fortified it by high walls and towers. In 1395 Tamerlane took the town and sacked it. In 1471 the Turks conquered it and called it and the neighboring sea Asak. The closing of the Black Sea by the Turks to all navigation, followed by the discovery of the sea route to India, brought about the speedy decline of the town. In 1696 Peter the Great took it. Captured later more than once by the Turks, it was finally ceded to Russia in 1774, by the Treaty of Kutchuk-Kainardji. In 1855 it was bombarded and greatly injured by an allied English and French squadron.

**AZOV,** SEA OF. A large gulf of the Black Sea, connected with it by the Strait of Kertch and inclosed by Russian territory (Map: Russia, G 5). Its greatest length is about 200 miles, its average width about 90 miles, and its area is 14,666 square miles of which islands cover 42 square miles. At its northeast extremity it becomes narrow and forms the Gulf of Taganrog. It has some islands, of which Berusch Island is the largest. The shores are mostly low and sandy, with only here and there, especially on the south, a short strip of rocks. Its waters contain very little salt—so little, indeed, that in the neighborhood of Taganrog it is used for drinking. The waters are freshened by the Don and four smaller rivers that empty into it. It is very shallow and but poorly adapted for navigation. The three ports on its shores are Taganrog, Mariupol, and Berdiansk, annually visited by about 2700 vessels, with a tonnage of about 500,000. The sea is remarkably rich in fish. A narrow strip of the sea on the west, cut off from the main body by a long tongue of land and bordering on the Crimea, is called Sivash, or 'Putrid Sea.'

**AZPÉITIA,** ȧs-pā'ē-syȧ, *Castilian Sp. pron.* ȧth-pā'ē-tyȧ. A district town in the Spanish province of Guipúzcoa, situated on the Urola, a short distance from San Sebastian. It contains interesting remains of ancient buildings, has mineral springs, and a short distance to the west, on the road to Azcóitia, is situated the Loyola Monastery, occupying the site of the house in which the founder of the Society of Jesus, St. Ignatius of Loyola (1491–1556), is said to have been born. Pop., 1900, 6066; 1910, 6692.

**AZRAEL,** ăz'rā-ĕl (Heb. help of God). In Mohammedan belief, Azrael, also called Izrail, is the angel of death (Koran, surah xxxii, 11), and is often called Malak-al-Maut. It is he who separates the soul from the body, doing this gently or harshly, as the case may be. When a man has been God-fearing, the soul leaves as gently as water from a bag; but the soul of an infidel is drawn out as a hot spit out of wet wool. The angel of death figures also in Jewish literature.

**AZ'TEC** (from Nahuatl *aztlan,* place of the heron, or the 'Heron' clan). A name frequently used to designate all the ancient semi-civilized tribes of Nahuatlan stock in central and southern Mexico, but properly applying only to a small group of seven cognate tribes occupying the valley of Mexico and its immediate vicinity. According to tradition they had migrated together from the north. The principal tribe fixed its capital at Tenochtitlan, now the City of Mexico, and by successive wars of conquest gradually acquired dominion over nearly all the tribes of southern Mexico, thus building up the Mexican Empire; which flourished for perhaps

two centuries until overthrown by Cortés in 1521. Although possessed of a high degree of culture, perhaps, derived from their predecessors in the country, the Aztecs were distinguished for their cruelty and the bloody character of their religious rites. Some of their descendants, still retaining their ancient language, reside in outlying villages in the neighborhood of the City of Mexico. See CORTÉS; MEXICO; MONTEZUMA; NAHUATLAN STOCK.

**AZTEC CLUB OF 1847.** A society formed to cherish the memories and traditions of the Mexican War. The club was founded in the City of Mexico, in 1847. Membership proceeds by primogeniture. The members number about 225.

**AZUA,** ä-sōō'ä, or **AZUA DE COMPOSTELLA,** dä kŏm'pō-stĕl'yä. A town in Santo Domingo, in the island of Haiti, on the Bia River, 4 miles from Ocoa Bay, and 60 miles west of the city of Santo Domingo (Map: West Indies, E 3). It has sulphur springs, salt and asphalt deposits, extensive sugar plantations, and the horses of the neighborhood are greatly prized. The province of Azua affords excellent grazing land and abounds in mineral springs. Its population in 1900 was about 50,000. Pop., 2000.

**AZUAY,** ä'sōō-ī'. A province in the southwestern part of Ecuador, with an area of about 11,150 square miles. The surface is mountainous. Agriculture, cattle raising, weaving, and the making of pottery are the chief occupations of the inhabitants, who are mostly Indians. The cinchona tree is found in abundance on the mountain slopes. Pop., 132,400. Capital, Cuenca.

**AZULEJO,** ä'thōō-lā'hō (Sp. *azul,* blue; see AZURE). The name given, on account of its prevailing color, to a kind of painted glazed tile made originally by Mohammedan artists in Persia, Egypt, Spain, etc., and used for the decoration of wall surfaces. (See TILES.) Some patterns were repeated century after century, and the Spaniards, who inherited the art of making them from the Moors, modified the designs and colors so slightly that it is not always easy to distinguish a Renaissance from an early mediæval Spanish tile.

**AZUNI,** ăd-zōō'nē, DOMENICO ALBERTO (1749–1827). A distinguished Italian jurist and historian, born at Sassari, in the island of Sardinia. In his youth he began the study of law, devoting himself particularly to the maritime relationships of nations, on which he became a great authority. He was judge of the tribunal of commerce at Nice when that city was occupied by the French in 1792, and then retired to Florence, where in 1795 he published his *Sistema universale dei principi del diritto marittimo dell' Europa,* which appeared afterward in French as *Droit maritime de l'Europe* (trans. by J. M. Digeon, Paris, 1797), and in an English translation by William Johnson (New York, 1806). He was summoned to Paris to act as one of the commissioners for compiling the new commercial code, and in 1807 was appointed president of the court of appeal at Genoa. After the downfall of Napoleon he was made judge of the tribunal at Cagliari, and director of the university library. He also published the following: *Dizionario universale ragionato della giurisprudenza mercantile* (1786–88); *Histoire géographique, politique et naturelle de la Sardaigne* (1802).

**AZURE** (OF. *azur,* ML. *lazurius,* also *azura* with the loss of *l* due to confusion with the article; from Pers. *lazhward,* azure, *lājaward,* lapis lazuli). The name for blue in heraldry and hence also the blue color in coats of arms.

**AZURINE** (from the azure color). A variety of one of the European chubs or roach, the rudd, distinguished from the type by the slate-blue color of the back, the silvery white of the abdomen, the whiteness of the fins, and the fact that the iris of the eye is tinged with pale straw color, instead of the red of the rudd or "red-eye." Hence it is frequently called "blue roach," and is known in science as *Leuciscus erythropthalmus,* variety *cœruleus.* It is an inhabitant of the Swiss lakes and of the streams of the continent of Europe generally; and is said to have been introduced into Great Britain by Yarrell. It does not exceed a pound in weight, but is hardy, furnishes good sport for the angler, and breeds readily; nevertheless it has not spread far from Knowsley, the seat of the Earl of Derby, in whose park it was first acclimated. Its flesh is firm and of good flavor. See ROACH.

**AZURITE** (from its azure color). A basic copper carbonate, containing about 55 per cent of copper and crystallizing in the monoclinic system. It differs in composition from malachite only by containing more carbonic acid and less water. Azurite occurs in sharply defined crystals of a rich dark blue color and in columnar masses and velvet-like incrustations. It is usually found with malachite and other ores of copper, and the specimens from Chessy, near Lyons, France, are noted for their fine crystallization and are called *chessylite.* The azurite from Siberia is frequently cut in Russia into thin slabs and used as veneering for table tops and the like. Crystals of azurite, found in Arizona, are highly regarded as gems, although they are too small to be extensively used and too soft to wear well. Azurite is a valuable ore of copper; it occurs in great quantities in some of the Arizona mines, where it is actively wrought. In the Clifton district it is found in limestone and is accompanied by other ores of copper, including malachite, cuprite, melaconite, and native copper, and by limonite. The Copper Queen Mine in the Bisbee district has produced solid masses of azurite and malachite weighing several tons. The mineral in all cases is probably to be regarded as of secondary origin; i.e., it has been derived from other copper minerals by the natural processes of oxidation and hydration. The original sources of material are copper sulphides, which are still found in the deeper portions of the mines where the weathering agencies have not penetrated. Azurite has also been used as a pigment.

**AZYGOS** (Gk. ἄζυγος, *azygos,* unwedded, not paired, from ἀ, *a,* priv. + ζυγόν, *zygon,* yoke). A term used in medicine to describe a part or a structure which has no fellow of the opposite side of the body, as the sphenoid bone, certain single veins and arteries. The word is also applied to the muscle of the uvula, which was named the *azygos uvulæ* under the mistaken idea that it was a single muscle with two origins, viz., at the posterior nasal spines of the palate bone, and running thence to the tip of the uvula. It is now known that these muscles occur in pairs. Their function is to raise the uvula. This pair is sometimes called the *azygos Morgagni.*

**AZYMITES** (ἀ, *a,* priv. + ζύμη, *zymē,* leaven). The opprobrious name given by the Eastern to the Western church, arising from the use by the latter, in the Lord's Supper, of unleavened bread. Michael Cærularius, Patriarch

of Constantinople (1043–59), made this one of his counts against the Western church, and ever since it has been so considered. The Western church retorted with "Pro-zymites," also "Fermentarians."

In the "Longer Catechism of the Eastern Church," prepared by Philaret, approved by the Holy Synod in 1839, and constituting the most authoritative doctrinal standard of the Orthodox Græco-Russian church, question 328 is: "Of what kind should be the bread for the Sacrament?" and the answer is: "Such as the name itself of the bread, the holiness of the Mystery, and the example of Jesus Christ and the Apostles all require; that is, leavened, pure, wheaten bread" (cf. Schaff, *Creeds of Christendom*, vol. ii, pp. 496).

The exact time when the Western church first employed unleavened bread in the Eucharist to the exclusion of the leavened is undetermined and, perhaps, undeterminable; but surely this use can be traced to the ninth century. The canons of earlier councils, e.g., of the Council of Toledo (693) and of Chelsea (787), upon the bread merely prescribe that it should be a specially prepared loaf, but not that it should be leavened or unleavened. Cf. art. "Elements," in Smith and Cheethan, *Dict. Christ. Antiq.*

# B

**B**, The second letter in the Græco-Roman alphabet, and the second in all European alphabets derived from it, except the Russian and others which go back to the mediæval Greek. Though the B has retained its position in the Russian alphabet, it has changed its pronunciation from *b* to *v*, a new symbol having been invented for the *b*-sound. The Græco-Phœnician character had a closed loop, which in the Aramaic alphabets opened out, assuming the shape seen in the square Hebrew and the Arabic letter. There were two complete loops in the Greek form, from which was developed the prevalent cursive form B. According to Flinders Petrie (*The Formation of the Alphabet*, London, 1912), the entirely closed form of the letter B begins as early as the twelfth dynasty in Egypt, continued later in the same country, and became the standard form of both Greece and Italy. The minuscule *b* of our alphabet is from the majuscule Latin of the mediæval manuscripts, of which it is a mere simplification. It is found as early as the first century of our era, scratched on the walls of buildings in Pompeii. In time the upper loop was lost, and the letter assumed practically its present form. (For the history of the minuscule *b*, consult Prou, *Manuel de paléographie*, 3d ed., Paris, 1910, p. 50, and Sir E. M. Thompson, *Introduction to Greek and Latin Palæography*, Oxford, 1912). The Hebrew name for the letter is *beth*, 'a house,' because the original pictographic form was the outline of a house or tent. This word appears as *βῆτα*, *bēta*, in the Greek alphabet, and is retained in our word *alpha-bet*. See ALPHABET; LETTERS.

**Phonetic Character.** B is the voiced or soft labial explosive. According to certain fixed laws, it may interchange with *p*, *v*, or *f*. (See PHILOLOGY; PHONETICS; GRIMM'S LAW.) Thus, Lat. *bibo*, I drink, Skt. *pib-āmi*, Old Irish *ibim*, Cornish *eve*, Breton *eva;* and Gk. *ἐπίσκοπος*, *episkopos*, bishop, AS. *biscōp*, Fr. *évêque;* again (orig. *bh*) Skt. *bhar-āmi*, I bear, Gk. *φέρω*, *pherō*, Lat. *fero*, Eng. *bear*. In Greek and late Latin *b* was softened to *v*, as is the case in modern Greek to-day. During the classical period of Latin the sound was that which we now have. But later it had the sound of *v*, which in many cases passed into French and Italian; for example, Lat. *habere*, It. *avere*, Fr. *avoir;* and Lat. *tabula*, It. *tavola*. In Spanish *b* has a bilabial sound produced by pronouncing *v* with the lips instead of against the teeth. Before *s* or *t*, the *b* in Latin was sounded like *p*, as we know from inscriptions where *pleps* is written for *plebs* and *urps* appears for *urbs*. Thus we have *scripsi* for *scrib-si*, and *opsequor* for *ob-sequor*. The letter *b* is silent now in some words of Latin derivation, like *debt*, *doubt*, and also when excrescent, as in *limb* (AS. *lim*), *lamb*, *thumb*, and the like.

**As Abbreviation.** B is used also as a symbol and in abbreviations. The Greek *β* denoted 2, and B 2000. In general, it indicates the second of a series, as Company B of a regiment, etc. In chemistry B stands for *boron*, one of the elements. In music B denotes the seventh or "leading" tone of the diatonic scale of C. In nautical language the minuscule *b* signifies a "blue sky." In academic degrees B. is an abbreviation of *Baccalaureus*, *Bachelor*. See ABBREVIATIONS.

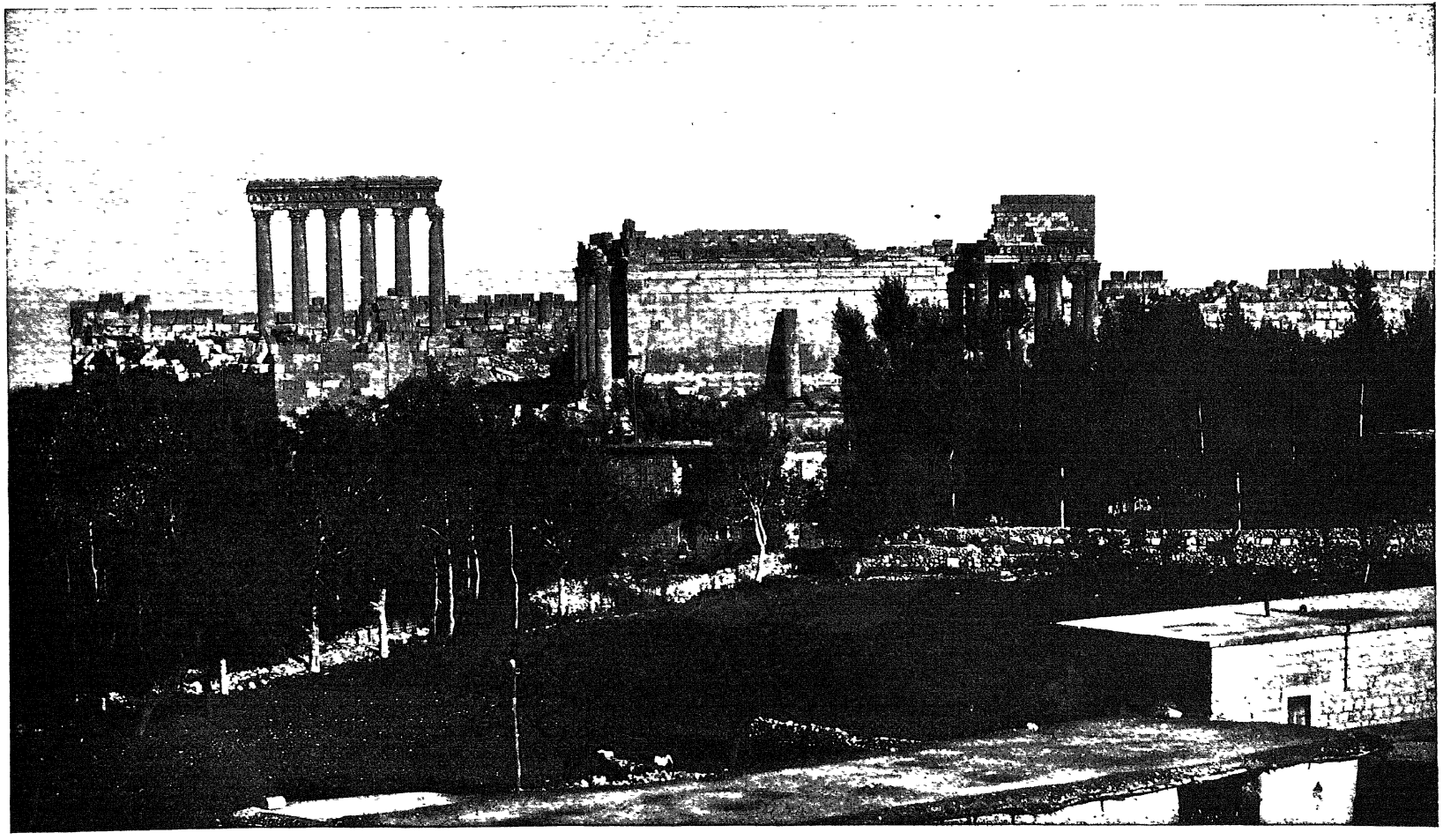
**BAADER,** bä'dĕr, BENEDICT FRANZ XAVER VON (1765–1841). A German Roman Catholic theologian and philosopher. He was born in Munich, March 27, 1765, the third son of the court physician to the Elector of Bavaria. His elder brothers were distinguished, Clemens as an author and Joseph as an engineer. Franz studied medicine at Ingolstadt and Vienna, graduating in 1784; assisted his father in medicine, but disliked the profession; studied engineering in the mining districts, and lived five years in England (1791–96), where he became acquainted with rationalistic philosophy, which he thought little less than satanic. The religious speculations of Eckhart, St. Martin, and especially Böhme, were more to his mind. He was a friend of Jacobi, and, for a time, of Schelling. Though deeply interested in philosophy, he kept his engineering practice. On his return from England he was appointed consulting engineer of the Bavarian mines; won the prize of 10,000 gulden for the discovery that Glauber's salt, instead of potash, may be employed in making glass; was ennobled in 1813 for his valuable services, and was superintendent of mines, 1817–20. His first published work was *Fermenta Cognitionis* (Berlin, 1822–24, five parts; sixth part, Leipzig, 1825), in which he combated modern philosophy and recommended that of Böhme. In 1826 he was appointed professor of philosophy and speculative theology in the new University of Munich. Some of his lectures while occupying that chair have been published (*Vorlesungen über spekulative Dogmatik*, Münster, 1828–38). In 1838 he opposed the interference in civil matters of the Roman Catholic church, to which he belonged, for which opposition he was interdicted from

lecturing on the philosophy of religion during the last three years of his life. His criticism of the papacy and his desire to see it abolished no doubt contributed to his being silenced. Baader is considered to have been the greatest speculative Roman Catholic theologian of modern times, and his influence has gone beyond the bounds of his church. He also contrasted Eastern and Western Catholicism, to the detriment of the latter (Stuttgart, 1841); but ere he died he recanted. He died in Munich, May 21, 1841. His works were published in a collected edition (Leipzig, 1851–60, 16 vols.; vol. xv contains his biography, by F. Hoffmann). Consult: J. Claasen, *Franz von Baader's Leben und theosophische Werke als Inbegriff christlicher Philosophie: Vollständiger, wortgetreuer Auszug in geordneten Einzelsatzen* (Stuttgart, 1886–87); Otto Pfleiderer, *The Philosophy of Religion on the Basis of its History*, vol. ii (Eng. trans., London, 1887); for an elaborate article upon his teachings, consult Hoffmann, *Biographie und Briefwechsel* (Leipzig, 1887); Welzer and Welte, *Kirchenlexikon*, vol. i (Freiburg, 1877).

**BAAL**, bā'al. A word common to the Semitic languages, and signifying 'owner' or 'possessor.' It is applied to the ordinary social conditions. The owner of a house or a field is its *baal*, and similarly the husband is the *baal* to his wife. From such a usage the term came naturally to be applied to the patron deity of a place to whom, in a measure, the place belonged, since he presided over its destinies. This application of Baal is particularly appropriate in the case of people who had reached the agricultural stage, and who would naturally ascribe the ultimate ownership of the fields to the local deity, whose favor was shown by a rich return from the soil. Hence Baal became, among Canaanites and Phœnicians, the general term designating a local deity; and the complement, added to the term, would indicate what particular Baal was meant. Thus we have a Baal of Tyre, of Sidon, of Mount Hermon, of Peor, of Meon, of the Lebanon, etc. Again, a Baal might be distinguished by some special attribute, and this would then be added to the term; as, e.g., Baal-Berith, 'Baal of the Covenant'; and, lastly, we find Baal as a general term for "lord," used as a honorific adjunct to the real name of a deity,—as Baal-Gad,—in which case Gad is the name of a god. There were thus as many Baals as there were towns, or sanctuaries, or objects which have a religious significance. Still, it is natural that certain Baals should become more prominent than others, and it might even happen that one should become the Baal par excellence. Thus in Babylonia, the deity of Nippur, one of the most ancient cities, became identified with Marduk of Babylon, and in consequence of the growing power of this city was finally recognized as the Baal or Bel of Babylonia, and was known to later ages simply as Bel; and again, in the West, the Baal of Tyre, whose name was Melkart, assumed at one time such prominence that his worship was introduced among the Hebrews by Ahab, and he is sometimes referred to in the Old Testament simply as Baal.

Sometimes the Baal idea is not connected with any particular place on earth but with the realms above; this gives rise to such cults as that of Baal-Hamon and Baal-Shamem, which acquire prominence among the Phœnicians and their offshoots. The former is probably the personification of the sun god; the latter is the god who dwells in heaven and bears analogies therefore to the Greek Zeus. In tracing the religious development of ancient nations in general, we must make allowance for this tendency to form conceptions of divine powers which seem to reach out into higher spheres. The Baal worship among the Hebrews, of which we hear so much in the Book of Kings and in the Prophets, represents the adoption on the part of the Hebrews of the Canaanitish cults. In dispossessing the Canaanites, the Hebrews wished to assure themselves of the good will of the numerous Baals; and since fertility of the soil was in the control of the Baals, as the Canaanites believed, the Hebrews, when they became agriculturists on Canaanitish soil, naturally took over the worship of the Baals at the various ancient sanctuaries of the land. In order to reconcile this departure with fidelity to the national deity, Yahwe himself was called Baal, and His name was thus associated with the cults at the altars and sanctuaries, which generally were erected on prominent spots, the so-called "high-places," or in groves. With Elijah, a movement to purify Yahwe's worship of its foreign elements begins, which, taken up vigorously by the prophets of the eighth and seventh centuries B.C., leads to tentative attempts in Judæa, such as the reforms of King Josiah, to stamp out the Baal rites; but it is not until the new conditions brought about by the destruction of the southern kingdom that the hope of the reformers to establish Jerusalem as the only legitimate sanctuary of Yahwe is realized, and in the Persian period a theocracy is established in which the once so popular Baal cult gradually disappears.

**BAALBEK**, bäl'bĕk. The name of a ruined city in ancient Cœle-Syria, signifying the "city of Baal," the sun-god. The name was converted by the Greeks, during the Seleucidan dynasty, into its Greek equivalent, Heliopolis. It is situated in lat. 34° 1′ N., long. 36° 11′ E., in the plain of Bukâ'a, "at the northern extremity of a low range of bleak hills, about one mile from the base of Antilibanon," in a well-watered and delightful locality, rather more than 40 miles northwest of Damascus. It was once the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments. It is now famous only for the splendor of its ruins, which date from Roman times. The most imposing is that of the great Temple of the Sun, which was a rectangular building 290 feet by 160, having its roof supported by a peristyle of 54 Corinthian columns, "19 at each side and 10 at each end." Of these, 6 are yet standing. The circumference of these columns is about 22 feet, and the length of the shaft 58; with pedestal, capital, and entablature, they measure about 80 feet in height. The bases still show the names of Antoninus Pius and Julia Domna. The temple occupies a platform on the Acropolis, about 1000 feet by 450 feet, approached on the east by a broad flight of steps, which lead to a portico. Beyond this is a hexagonal court, through which a large gateway opens into the great square, at the west end of which is the temple, on a lofty stylobate. Except the columns mentioned, little of the great temple, or of the buildings in front of it, is left standing, but the ground is covered with their ruins. The vast size of the stones used in the substructures of the great platform is remarkable, some of them being over 60 feet long and 12 in breadth and thickness. South from the



BAALBEK

GENERAL VIEW OF THE ACROPOLIS

great temple is a smaller one, known as the Temple of Bacchus. It is similar in form, having its peristyle and the walls of its cella still mostly standing. Its dimensions are 227 feet in length by 117 feet in breadth, with 15 columns at the sides and 8 at each end. Both temples, as well as the surrounding structures, were built of limestone, in a richly decorated, somewhat fantastic Corinthian style. Besides these, there stands at the distance of 300 yards from the others a circular building, supported on 8 granite columns of mixed Ionic and Corinthian style. It was once used as a Christian church.

The early history of Baalbek is involved in darkness, but it is certain that from the most distant times it had been a chief seat of sun worship, as its name implies. Augustus made it a Roman colony and placed there a garrison. Baalbek had an oracle held in such high esteem that in the second century A.D. it was consulted by the Emperor Trajan prior to his entrance on his second Parthian campaign. Antoninus Pius (138–161 A.D.) built the great temple which the legend current among the modern inhabitants counts a work of Solomon; Septimius Severus dedicated the two temples. The platform and substructures are, however, of a much earlier date. This temple is said to have contained a golden statue of Zeus, identified with the Sun, which on certain annual festivals the chief citizens of Heliopolis bore about on their shoulders. When Christianity under Constantine became the dominant religion, the temple became a Christian church. In the wars that followed the taking of the city by the Arabs, who sacked it in 748 A.D., the temple was turned into a fortress, the battlements of which are yet visible. The city was completely pillaged by Timur in 1400; in 1517 it came into the hands of the Turks. Both city and temple continued to fall more and more into decay under the misery and misrule to which Syria has been subject ever since. Many of the magnificent pillars were overturned by the pashas of Damascus, merely for the sake of the iron with which the stones were bound together. What the Arabs, Tatars, and Turks had spared was destroyed by a terrible earthquake in 1759. Baalbek is now an insignificant village, with a population of some 2000, of whom more than half are Christians. The Prussian government conducted, in 1902, extensive excavations on the Acropolis.

Consult: Wood and Dawkins, *Ruins of Baalbec* (London, 1757); Cassas, *Voyage pittoresque de la Syrie* (Paris, 1799); Murray, *Handbook for Travelers in Syria and Palestine* (London, 1903); Frauberger, *Die Akropolis von Baalbek* (Frankfort, 1892); W. M. Thomson, *The Land and the Book*, vol. iii (New York, 1886); Baedeker, *Syria and Palestine* (Leipzig, 1898); Puchstein, in *Jahrbuch des deutschen Archäologischen Instituts* (Berlin, 1902); id., *Führer durch die Ruinen von Baalbek* (1905).

**BAAL-ZEBUB**, bā'al-zē'bŭb. The god of Ekron, according to 2 Kings i. 2 ff., to whom Ahaziah sent from Samaria for an oracle, an act for which he was severely censured by Elijah. Baal means 'lord'; it is not certain what "Zebub" refers to. It has been very generally translated 'fly,' and the god of Ekron understood to be a "lord of flies." Winckler plausibly suggests that Zebub was the name of the hill on which the temple stood in Ekron. The god is possibly referred to in the Assyrian inscription, K 3500, as Ba-al-za-bu (bi-i). See BEELZEBUB.

**BAARLE**, bär'le, or **BAERLE**, VAN. See BARLÆUS, KASPAR.

**BAB**, LADY. The name assumed by Kitty, the maid, in James Townley's *High Life below Stairs*. She has an exaggerated idea of her own breeding and never reads any book except "Shikspur." Her pseudonym is taken from the name of her mistress.

**BAB**, THE. See BABISM.

**BABA**, bä'bà. A Turkish word (*bābā*), which signifies 'father.' In Persia and Turkey it is prefixed as a title of honor to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons as Ali-Baba.

**BABADAGH**, bä'bà-däg' (Turk. *bābā*, father, chief + *dagh*, mountain). A town in the district of Tultcha (Dobrudja), Rumania, situated in a marshy district, 31 miles southwest of Ismail (Map: Balkan Peninsula, G 2). It has five mosques, of which the finest is the one built by Bajazet I, who founded the city. He peopled it with Tatars and named it after a saint, whose monument on a hill near by is a much-frequented pilgrim resort. Through the port of Kara-Kerman, lying a short way to the south, a considerable commerce is carried on with the Black Sea region. Many sheep graze in the district, and Babadagh is a centre for considerable trade in wool. Pop., in 1899 (latest report), 3100.

**BAB'BAGE**, CHARLES (1792–1871). An English mathematician and inventor, born near Teignmouth, Devonshire. He early devoted himself to mathematics, particularly its analytical branches, and pursued his systematic education at Trinity College, Cambridge, from which he received his baccalaureate degree in 1814. Two years after graduating he published, jointly with Herschel and Peacock, a translation of Lacroix's *Calculus*, and four years later they published an excellent collection of mathematical problems. Meanwhile the idea of constructing a machine for calculating mechanically various tables of mathematics and astronomy had been ripening in Babbage's mind, and in 1820 he undertook the practical execution of this difficult task. The model of his machine was found eminently satisfactory by the Royal Society in 1823, and the government consented to aid him in carrying out the idea on a large scale. In order to familiarize himself with all the resources of mechanical art, he visited manufactories and machine establishments in Great Britain and in 1827–28 traveled on the Continent. These investigations resulted in a number of highly valuable improvements in machinery and manufacturing processes, and although the completion of his main task was not yet in view, important service was rendered by the publication of his brilliant work, *On the Economy of Manufactures and Machinery*, the first edition in 1832, and several subsequent editions and translations into foreign languages. The government, however, fearing that the construction of his calculating machine was an impossibility, had refused to give him further aid; and thus Babbage was thrown upon his own resources, continuing his work until 1856, but never completing it. Yet the realization of his machine is even now considered as quite possible, and its inestimable value in case it were realized is appreciated by some of the best mathematicians of our time. While mainly de-

voted to his invention, Babbage also made a number of important contributions to pure mathematics. He invented a new and important branch of higher analysis, wrote on the applications of mathematics to questions of insurance and gambling, and did much to raise the standard of mathematical teaching in England. In recognition of his services to science, he was made a member of many learned societies, and from 1828 to 1839 was nominally Lucasian professor of mathematics at Cambridge. He was one of the founders of the Astronomical Society and to his writings was due in great measure the founding of the British Association. The list of his works includes as many as 80 titles, but most of his writings were left uncompleted. Among his works that deserve notice are his excellent *Table of Logarithms* (1827), and the autobiographical *Passages from the Life of a Philosopher* (1864).

**BAB BAL'LADS,** THE. A collection of doggerel verses by W. S. Gilbert, half nonsense, half satire, on various subjects, ranging from the shipwreck of corpulent admirals to the loves of the London "bobby." It was published in London in 1868, but the ballads had previously appeared separately in *Fun*.

**BAB'BITT,** IRVING (1865– ). An American scholar and educator. He was born in Dayton, Ohio, and received his university education at Harvard, from which he graduated in 1889, and in Paris, where he studied in 1891–92. After a year as instructor in Romance languages at Williams College he was appointed (1894) instructor in French at Harvard, and later (1902) assistant professor in that department. His publications, besides literary articles in magazines and reviews, include *Literature and the American College* (1908); *The New Laokoön* (1910); *Masters of Modern French Criticism* (1912). Also he edited Taine's *Introduction à l'histoire de la littérature anglaise* (1898); Renan's *Souvenirs d'enfance et de jeunesse* (1902); Voltaire's *Zadig* (1905); Racine's *Phèdre* (1910).

**BABBITT,** ISAAC (1799–1862). An American inventor, born at Taunton, Mass. He became a goldsmith and manufactured at Taunton (1824) the first Britannia ware made in the United States. In 1839 he invented the alloy known as "Babbitt metal" (q.v.). This metal, and also soap, he afterward manufactured extensively.

**BABBITT MET'AL.** A soft, white, antifriction alloy, invented by Isaac Babbitt in 1839. It is prepared by melting separately 4 parts of copper, 12 parts of tin, and 8 parts of antimony, to which, when it is completely melted, there are added 12 more parts of tin. The antimony is poured into the tin, and then mixed with the copper away from the fire, in a separate pot. The proportions vary somewhat, according to the purposes for which the alloy is intended. For this invention Babbitt received a gold medal from the Massachusetts Charitable Mechanics' Association in 1851 and later the sum of $20,000 from Congress. It was patented in England and also in Russia.

**BAB'COCK,** JAMES FRANCIS (1844–97). An American chemist and scientific lecturer. He was born in Boston in 1844. After studying chemistry at the Lawrence Scientific School, he established in Boston an analytical laboratory. He was professor of chemistry at the Massachusetts College of Pharmacy and at Boston University and for many years filled the positions of State assayer and inspector of liquors and city inspector of milk. He is known as the inventor of a fire extinguisher and as a scientific lecturer, and has published a number of official reports on sanitary topics.

**BABCOCK,** MALTBIE DAVENPORT (1858–1901). An American Presbyterian clergyman. He was born at Syracuse, N. Y., Aug. 3, 1858; graduated at Syracuse University in 1879 and at Auburn (N. Y.) Theological Seminary in 1882; became pastor of the First Presbyterian Church, Lockport, N. Y., in 1882; of the Brown Memorial Church, Baltimore, Md., in 1887; and of the Brick Presbyterian Church, New York City, 1899. On the very threshold of what promised to be an exceptional career, he died at Naples, Italy, May 18, 1901, as he was on his way home from a trip in the East. After his death his wife and Miss Sanford published some selections from his spoken and written words, including some admirable poems, under the title *Thoughts for Every-Day Living* (New York, 1901); and later appeared *Letters from Egypt and Palestine* (1902). Consult his life, by Robinson (New York, 1904); and Stone, *Footsteps in a Parish* (New York, 1908).

**BABCOCK,** ORVILLE E. (1835–84). An American soldier, born at Franklin, Vt. He graduated at West Point in 1861 and served in the Federal army throughout the Civil War. He was aid-de-camp to General Banks in July and August, 1861; served in the Peninsular campaign; was chief engineer for the Central District of Kentucky from April to June, 1863, and of the Department of Ohio from January to March, 1864; and, as lieutenant-colonel, was aid-de-camp to General Grant in the Richmond campaign. On March 13, 1865, he was brevetted brigadier-general of volunteers, for "gallant and meritorious services in the field." He afterward continued to serve as Grant's aid-de-camp until 1869, and from 1869 to 1877, during the latter's term as President, was his private secretary. After 1871 he also served as superintending engineer of public buildings. In 1870, as President Grant's unofficial representative, he negotiated with Santo Domingo a treaty of annexation, which, however, was rejected by the Senate. In 1876 he was accused of being implicated in the "Whisky Ring" frauds, but was acquitted on trial. He was drowned at Mosquito Inlet, Fla., on June 2, 1884.

**BABCOCK,** STEPHEN MOULTON, LL.D. (1843– ). An American agricultural chemist, born at Bridgewater, Oneida Co., N. Y. He graduated at Tufts College in 1866 and studied chemistry at Cornell University and at Göttingen University. From 1882 to 1888 he served as chemist to the New York State Agricultural Experiment Station and in 1888 became professor of agricultural chemistry at the University of Wisconsin and chemist to the Wisconsin Agricultural Experiment Station. He also became assistant director of the station in 1901, but retired from all active service in 1913. He investigated especially the chemistry of milk, cheese, and other dairy products, but also worked on the chemistry of silage and the rôle of metabolic water. His best-known service was the invention in 1890 of the Babcock milk tester for ascertaining the amount of fat in milk, cream, etc. This test is now widely used for the purpose the world over, and has been of the utmost value to the dairy industry. The

Wisconsin Legislature presented him with a bronze medal in 1901 in recognition of this and other services to agriculture, and rewards of merit were granted him by the Paris and St. Louis expositions.

**BABCOCK,** WINNIFRED EATON. See WATANNA, ONOTO.

**BABEL, TOWER OF.** The name given to the structure erected in the valley of Shinar in connection with which the confusion of tongues is said to have taken place (Gen. xi.). At a time when all men still formed a single united body and possessed the same speech, they came in the course of their wanderings to this valley, or plain, where they devised a plan of using clay as building material and bitumen as cement. They are represented as the first city builders; but in addition they are fired with the ambition to erect a tower which shall reach to heaven and which, being visible everywhere, shall prevent them from being dispersed over the face of the earth. But this plan arouses jealousy on high. While men are encouraging one another in this great enterprise, the gods in heaven, fearing this encroachment upon their own realm, exhort one another, saying, "Come, to this place, let us go down, and there the speech of all confound, so that no man shall understand the language that his neighbor speaks." They go down and carry out this preventive measure, and, as a consequence, men cease to build the city, and they are scattered in all directions. The name of the place where the confusion of tongues is brought about is called Babel, which is explained as though from a root *balal*, meaning 'to confuse,' whereas in reality Babel signifies 'gate of god,' from *bab*, 'gate,' and *ilu*, 'god.'

The story seems to presuppose the existence of Babylon as an important centre and of a great tower not carried as far up into the sky as had been intended, a cessation of building activities and political weakness in place of earlier power and world-wide ambitions, and an influx of foreign elements, not easily assimilated by the native population, whose multiplicity of speech made common enterprises difficult. There can be no doubt that the *zikkurat*, or temple tower, north of the Marduk temple *E-sagila*, is meant. This structure was called *E-temen-an-ki*, or 'house of the foundation of heaven and earth,' probably because it both celebrated the creative act of Marduk and illustrated by its form and orderly arrangement the heaven and earth created by the god. There may also have been the idea that this was the foundation stone of the whole world structure. Its site has been found by the German explorers. It is now called El Sahan and is nothing but an immense hole in the ground c.330 feet square. A nucleus of brick is still left in the middle of the hole. As late as 1887 this tower was used as a quarry, a vast amount of brick being carried away from it. Included in the walls four inscribed clay tablets were found. The tower itself consisted of six platforms, or stages, and a sanctuary rising on the sixth. The lowest stage was 336 feet in length and breadth and 121 feet in height; the second, 286 feet each side and 66 feet in height; the third, 220 feet each side and 22 feet in height; the fourth, respectively, 187 and 22 feet; the fifth, 154 and 22 feet; the sixth, 121 and 22 feet; and the shrine on top was 88 feet in length, 77 feet in width, and 55 feet in height. It is probable that, as in the case of the tower at Borsippa, each stage exhibited a different color—that dedicated to Ninib black by a coating of bitumen, that to Marduk orange by the employment of brick of this hue, that to Nergal red, that to Shamash golden by a covering of thin plates of gold, that to Ishtar pale yellow by bricks of this color, that to Nabu blue by vitrifaction, and that to the moon a shining white by a covering of silver.

It is not known when the Tower of Babel was built nor by whom. It is likely to be as old as the E-sagila itself. After the destruction of the city by Sennacherib it was rebuilt again especially by Nabopolassar and Nebuchadnezzar, whose foundation tablets refer to "E-temen-an-ki . . . whose top should reach unto heaven." Some scholars think that a Jewish narrator living under Cyrus when they had ceased building the city some time after the fall of Nebuchadnezzar's world empire took these words literally and saw in them evidence of pride and blasphemy punished by the deity. But it is not necessary to descend to so late a period of history for this story and to assume that the author must have lived in Babylon after the deportation of Jews by Nebuchadnezzar. The *zikkurat* had been there since the earliest times; it was not a recent creation. The author looks back into remote antiquity when Babylon threatened to become the mistress of the world. That had been the case in the days of Hammurapi, remembered in Syria as Amraphel, and possibly long before his time. But this glory was in the past, when it was possible for a Hebrew poet to sing the Song of the Tower of Babel. On the other hand, the frank polytheism of the song shows that it is earlier than the great prophetic movement in Israel. The age of Solomon seems most probable. Towards the end of the eleventh century the power of Babylon was at a low ebb. Short-lived dynasties, most of them foreign, tried in vain to restore the prestige of the past. Even the Kassite domination had brought more wealth and influence to Babylon. An Elamite sat upon the throne from 1110 to 1004. All kinds of languages were spoken in the city—Sumerian, Akkadian, Amoritish, Kassite, Hittite, Mitannian, Chaldæan, Aramaic, Iranian. Once the builders on a temple or tower in Babylon had all understood one another; it was no longer so, but a veritable confusion of tongues. It was not necessary for the Hebrew poet to go to Babylonia himself, though he may, of course, have been there, in order to learn or to invent the story of how Babylon lost its power. Nor would he have to dig for some inscribed foundation stone to hit upon the idea that this ancient sky scraper which every traveler would refer to was intended to reach to heaven. A sense of the divisive influence of the difference of language and its tendency to breathe hostility and to frustrate common enterprises is not too advanced for Solomon's time; and it is not impossible that a warning to the great Jewish temple and palace builder was intended. For a description of the tower, see Weissbach, *Das Stadtbild von Babylon* (1904); Koldewey, *Das wiedererstehende Babylon* (1912); for the Song of the Tower in Gen. xi., Schmidt, *The Messages of the Poets* (1911); Gunkel, *Genesis* (3d ed., 1910).

**BAB-EL-MANDEB,** bäb'el-män'dĕb (Ar. 'gate of tears,' or 'of sorrow'). The strait separating Arabia, at its southwest extremity, from the continent of Africa, and connecting the Red Sea with the Arabian Sea and the Indian Ocean (Map: Asia, D 7). It is bordered

on the east by the Cape of Bab-el-mandeb, which rises to a height of 865 feet, and on the west by the precipitous coast of Africa, which reaches in Ras-Sejan an altitude of 400 feet. The strait is divided by the island of Perim into two channels—the western, 13 miles wide and 185 fathoms deep; the eastern, only about 2 miles in width and from 8 to 12 fathoms deep, but preferred on account of its safe anchorage. The volcanic islets called the "Eight Brothers," lie close to the African coast. The strait derives its name from the perils it offers to small sailing vessels.

**BABELSBERG** (bä'bels-bĕrk) **PAL'ACE.** A picturesque English Gothic chateau near Potsdam, built in 1835–49, in the midst of a beautiful park. The interior is simple but homelike and contains the study and many personal relics of Emperor William I, with whom Babelsberg was a favorite resort during the summer months.

**BABENBERG,** bä'ben-bĕrk, COUNTS OF. A line of Frankish counts whose ancestral seat was at Castle Babenberg, near the present Bamberg, in northern Bavaria. Poppo of Babenberg was Margrave of Thuringia till 892. His three nephews, Adelbert, Adalhard, and Henry, are celebrated for the desperate feud they carried on against the family of the Conradins, whose territorial acquisitions in Thuringia threatened the ascendency of the Babenbergs. The three brothers perished in the struggle. Luitpold of Babenberg—whose descent, however, from the Bavarian Babenbergs is not conclusively established—received from the Emperor Otho II in 976 the sovereignty over the East Mark. This his descendants ruled as margraves, and, after the Emperor Frederick I erected that territory into the Duchy of Austria (1156), as Dukes of Austria. Leopold III (ruled 1096–1136) refused the Imperial crown in 1125. He was afterward canonized and is the patron saint of Austria. It was one of the Babenbergs, Duke Leopold I (ruled 1177–94), who captured Richard I, King of England, on his return from Palestine and delivered him into the hands of the Emperor Henry VI. Duke Frederick II, the last of the Babenbergs, was killed in battle in 1246. See AUSTRIA-HUNGARY, *History*.

**BABER,** bä'bĕr, **BABAR,** or **BABUR,** ZAHIR UD-DIN MUHAMMAD (c.1482–1530). The first of the Great Moguls in India, a descendant of Timur and of Genghis Khan. He was barely 12 years of age when he succeeded his father, Omar Sheikh Mirza, in Ferghana, and he soon conquered the entire country between the Jaxartes and the Oxus. Later he was driven from Bokhara by the Uzbegs of Turkestan, and founded a new kingdom in Afghanistan. After making unsuccessful efforts to recover his realm in Turkestan, Baber turned his ambitious designs toward India. The weakness of Ibrahim Lodi, Emperor of Delhi, enabled him to carry out his schemes of conquest. After some preliminary incursions he crossed the Indus at the close of 1525, and in April, 1526, on the plain of Panipat, not far from Delhi, he fought a decisive battle with his enemy, whose army was far superior in numbers. The 100,000 men and 1000 elephants of Ibrahim Lodi were dispersed, Ibrahim himself fled and Baber made his entry into Delhi. In the following month Agra, the second city of the Empire of Delhi, surrendered. In 1527 Baber secured himself in the possession of his new realm by a great victory over the Rajputs. Thus was founded the famous Empire of the Great Mogul, which under Baber's successors rose to extraordinary splendor. Baber's enjoyment of empire in India was short; he died in 1530, having had to contend, during the four years of his reign, with numerous conspiracies and revolts. To the talents of a general and a statesman, which he manifested in his conquests, his improvements of public roads, measuring of lands, adjustment of taxation, postal arrangements, etc., Baber united a taste for science and art. He wrote, in the Chaghatáy Turkish language, the history of his own life and conquests, which was translated into Persian by Abd-ul Rachim, and later from the Persian into English by Leyden and Erskine in 1826. This work, called the *Bábar-Náma*, has been reproduced in facsimile form and edited by Annette S. Beveridge (London, 1905). Baber was succeeded on the throne of Delhi by the eldest of his four sons, Humayun. Consult Caldecott, *Life of Baber, Emperor of Hindustan* (London, 1844), and Stanley Lane-Poole, *Babar* (London, 1899).

**BABES IN THE WOOD.** A nursery tale, and a ballad of unknown origin, preserved in Percy's *Reliques* and in other collections. Two children are left to perish in the forest by an uncle, who expects to profit by their death.

**BABEUF,** bä'bĕf', FRANÇOIS-NOËL (1760–97). A French political agitator, regarded commonly as the founder of revolutionary socialism. He was born at Saint-Quentin, Nov. 23, 1760. He was at first a land surveyor. He became an enthusiastic adherent of the Revolution, and established a paper (*Journal de la Liberté de la Presse*) which, in July, 1794, began its second series of numbers under the title *La Tribune du Peuple*. Absolute equality, communism of land and property, the sovereignty of the masses—these were the ideals for which he stood and which he advocated in violent language. He spoke of himself as Gracchus Babeuf. He proposed to found a national estate upon the confiscated property of the corporations, and to add to this the property of private persons through the abolition of inheritance. Distribution, in the scheme of Babeuf, was to be based on need. His participation as ringleader in a plot to overthrow the Directory and establish a communistic state resulted in his execution in 1797. Consult Ely, *French and German Socialism* (New York, 1883), and Advielle, *Histoire de Babeuf et du Babouvisme* (Paris, 1884). See COMMUNISM; SOCIALISM.

**BABI,** bä'bē. See BABISM.

**BABINE** (Athapascan word, 'big lips'). Name applied to Athapascan or Dene Indians, near Babine Lake, British Columbia. They are a branch of the Takulli and comprise the Nataotin and Hwotsotenne.

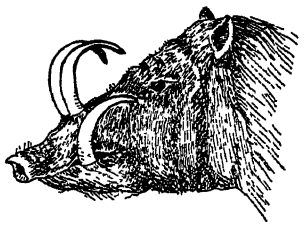
**BABINET,** bä'bē'nä', JACQUES (1794–1872). A French physicist, born at Lusignan, Vienne. He was appointed professor of physics at the Collège Saint-Louis at Paris and in 1840 was made a member of the Academy of Sciences. To him are due various improvements in the air pump, the hygrometer, and other apparatus. In general, however, he was known less as an investigator than as a clever expositor. His publications include: *Traité de géométrie descriptive* (1850); *Etudes et lectures sur les sciences d'observation et leurs applications* (1855–68); *Télégraphie électrique* (1861).

**BAB'INGTON,** ANTONY (1561–86). An Eng-

lish Roman Catholic gentleman and conspirator. He was born at Dethick, Derbyshire, October, 1561. At 10 years of age he was left an orphan with a rich heritage and became a page to Mary, Queen of Scots, during her imprisonment at Sheffield. In 1586 he was pursuaded by Ballard and other Catholic emissaries to head a plot to murder Queen Elizabeth, to effect the release of Mary, and to organize a general uprising of the Catholics. Babington's conduct during the plot was foolish and vain. He insisted on keeping up a correspondence with Mary, in the hopes of some token of appreciation from her, and, through these letters, the conspiracy became known to Walsingham, Elizabeth's secretary, who at the right moment arrested Babington and his accomplices. They were condemned and executed by hanging and quartering in London, Sept. 20, 1586. Four months later, Mary, Queen of Scots, was beheaded, mainly on the evidence of a letter approving of the murder of Elizabeth, which she had written to Babington. She denied the authorship, and her friends maintained that the document was written by Walsingham himself, as a trick to implicate and entrap the conspirators; but the truth of this accusation is, at least, doubtful. On the day of his death Babington explained the cipher in which the letter was written; and there is other evidence, alleged to be satisfactory, of Mary's complicity in the plot. Consult *Maria Stuarts Briefwechsel mit A. Babington* (Munich, 1886), and Collier, "Fourteen Notable Traitors," in vol. i, *Illustrations of Early Popular Literature* (London, 1863).

**BABINGTON,** Churchill (1821–89). An English clergyman and archæologist, born at Roecliffe, Leicestershire. In 1839 he entered St. John's College, Cambridge, and there he held a fellowship from 1846 to 1867, being elected an honorary fellow in 1880. From 1865 to 1880 he was professor of archæology at Cambridge. He became an authority on Greek and Latin antiquities, especially manuscripts, pottery, and coins, of which he had a notable collection. His classical scholarship was demonstrated by his *editio princeps* of the orations of Hyperides that were contained in the papyri discovered in 1847 and 1856 at Thebes. These comprised the speeches *Against Demosthenes* (1850), *On Behalf of Lycophron and Euxenippus* (1853), and the *Funeral Oration* (1858). He found opportunity also to publish many works on botany, ornithology, and conchology, in which subjects he was an authority. He was the author of a *Catalogue of Birds of Suffolk* (1884–86) and *Flora of Suffolk* (1889), and in 1842 prepared the appendixes for the departments of botany and ornithology in the *History and Antiquities of Charnwood Forest* (Potter). Ecclesiastical subjects received their share of his attention, for he published a defense of the clergy in *Mr. Macaulay's Character of the Clergy . . . Considered* (1842), and edited Bishop Pecock's *Repressor of Overmuch Blaming of the Clergy* (1860). In 1885 he brought out an edition of *Beneficio della Morte di Cristo*, a rare book of the period of the Reformation, and in 1858 edited the first two volumes of *Polychronicon.* (See Ranulf Higden.) Besides, he catalogued the classical manuscripts in the library of Cambridge University and contributed to Smith's *Dictionary of Christian Antiquities* and numerous scientific periodicals.

**BABIRUSSA,** băb'ĭ-rōō'sà (Malay *bābī*, hog + *rūsa*, deer). An East Indian wild hog (*Babirusa alfurus*), inhabiting Celebes and Buro, called also "horned hog" and "pig deer." It is nearly naked, slender-legged, and active, and feeds upon fallen fruits instead of rooting in the ground. The boar is remarkable for his long, exposed canine teeth. "The tusks of the lower jaw are very long and sharp; but the upper ones, instead of growing downward in the usual way, are completely reversed, growing upward persistently out of long sockets through the skin on each side of the snout, curving backward to near the eyes, and in old animals often reaching 8 or 10 inches in length." It is difficult to understand the use of these teeth, which are not possessed by the sows. A. R. Wallace offers, as explanation, that they probably were once useful and were then kept worn down by constant use, but that changed conditions of life have rendered them unnecessary, and they now develop into monstrous form, as will the persistently growing teeth of beavers and rabbits when distorted so that the opposite teeth do not wear them away.



TUSKS OF BABIRUSSA BOAR.

**BABISM,** băb'iz'm. A term applied to the beliefs of a sect in Persia, founded by Mirza Ali Muhammad ibn Radhīk, born about 1824, who assumed the name of Bab-ud-Din, i.e., 'gate of the faith.' On returning from a pilgrimage to Mecca in 1843, the Bab appeared in his native city of Shiraz with a new commentary on the Koran, and soon became engaged in controversy with the regular priests, or *mullahs*, who, exasperated by his free criticism of their conduct, obtained an order forbidding him to teach in public and confining him to his house. He taught privately, however, but increased his pretensions, until he declared he was the Nuqtah, 'the point,'—an epithet of Mohammed as well. He thus claimed to be not merely the recipient of a new divine revelation, but the focus in which all preceding dispensations converged. He gained proselytes rapidly. Among these was a woman—a remarkable circumstance in any country of the East—known as Gurrad-ul-Ain ('consolation of the eyes'), because of her surpassing loveliness, which was enhanced by her intelligence and purity. The sect made rapid progress with their new religion, but they were not molested until the accession of Nasr-ed-Din (Nasiru'd-Din) in 1848. At this juncture the Babis, in fear of persecution by the new Shah, arose in rebellion and proclaimed the Bab as a universal sovereign, when a civil war ensued. Hussein, one of the disciples, was made prisoner, after defeating several expeditions sent against him, and was put to death in 1849; and the next year Baliurushi, another leader, was slain in battle. The Bab himself, who had taken no active part in the rebellion, was imprisoned and executed at Tabriz, in 1850, after a long incarceration; but his death did not discourage his followers. They recog-

nized Mirza Yahya, a youth of noble descent, and son of the Governor of Teheran, as his successor, who established himself in Bagdad. An attempt, in 1852, of some zealous Babis to assassinate the Shah led to a terrible persecution in which the beautiful "consolation of the eyes" perished.

The Babi doctrines are essentially a system of pantheism, with additions from gnostic and other sources, and they may be regarded as a development of the mystic or Sufiistic movement against the orthodox Mohammedanism of the Sunnis, which has lasted with great persistence since the first introduction of Islam into Persia. All individual existence is regarded as emanating from the Supreme Deity, by whom it will ultimately be reabsorbed. Great importance is attached to the number 7, as indicating the attributes supposed to be displayed in the act of creation; and to the number 19, which mystically expresses the name of the Deity himself and is, moreover, the sum of the prophets among whom the latest incarnation of the divine nature is conceived to be distributed in the present dispensation, and of whom the Bab himself is the chief. The sacred college cannot become extinct until the final judgment, the death of any of its members being immediately followed by a reincarnation. Moses, Christ, and Mohammed are considered to be prophets, but merely precursors of the Bab and inferior to him. The morals of the sect are good; polygamy and concubinage are forbidden; and the equality of sex is so far recognized that at least one of the 19 prophets must always be a woman. Women join in social intercourse and are freed from many of the degradations to which orthodox Mohammedanism subjects them, such as the extreme facility of divorce on the part of the husband. Asceticism is discountenanced, mendicancy forbidden; abstinence from intoxicating liquors and drugs and tobacco, as well as prohibition of slave dealing, are taught and practiced. The Babis live in outward conformity to the religion of Mohammed. The faith of the Bab has found a few adherents in America.

Consult: Browne, *A Traveler's Narrative Written to illustrate the Episode of the Bab* (Cambridge, 1892); Huart, *La religion de Bab* (Paris, 1889); Andreas, *Die Babis in Persien* (Leipzig, 1896); Phelps, *Life and Teachings of Abbas Effendi* (New York, 1903); Beha-Ullah, *Les Préceptes du Béhaisme* (trans. by Dreyfus and Chirazi, Paris, 1906); Mírzá Huseyn, *Le Béyân arabe; le livre sacré du Babysme* (Paris, 1905); Dreyfus, *Essai sur le Béhaïsme* (Paris, 1909).

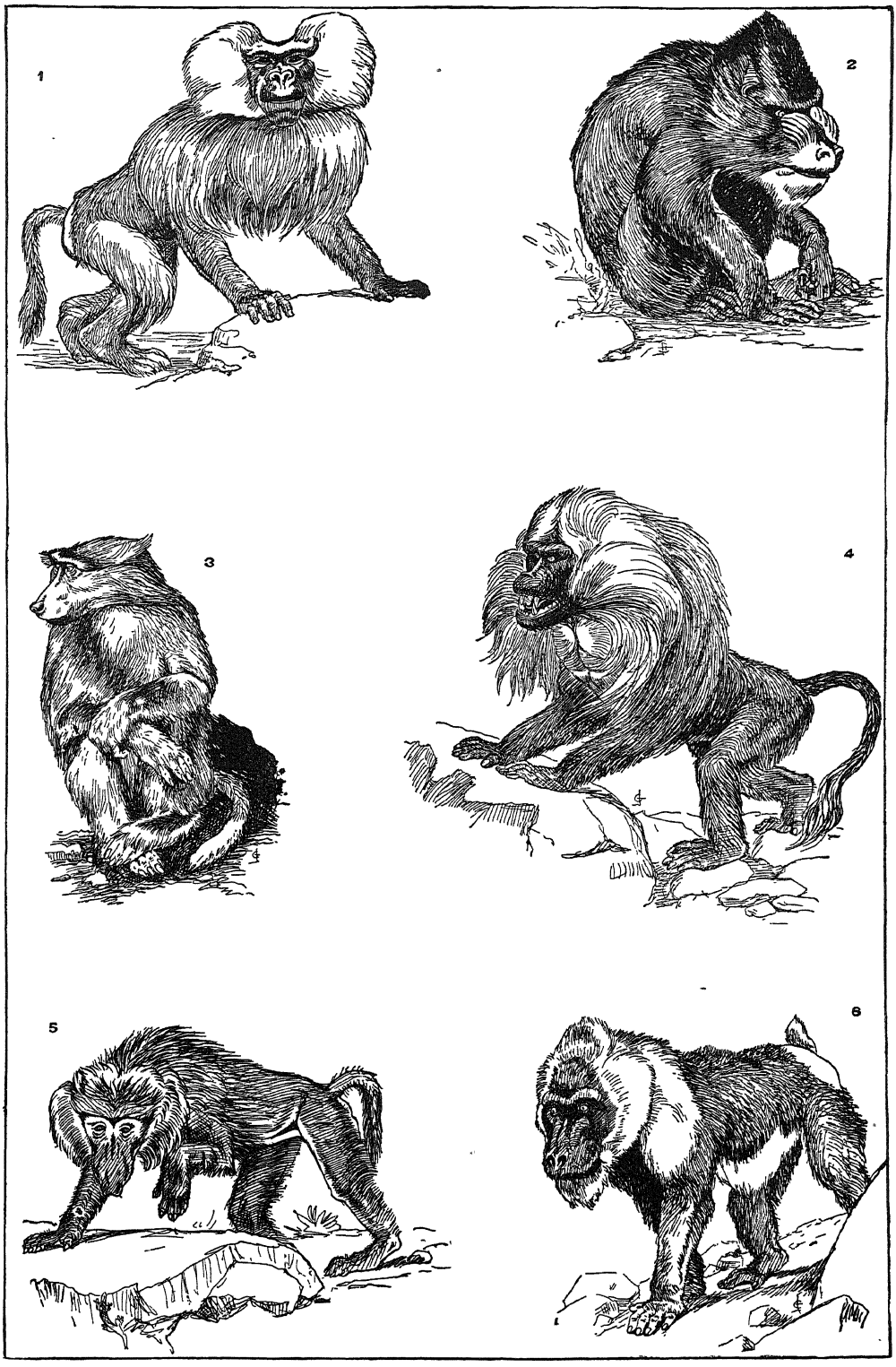
**BABOO,** bä'bōō, or **BABU** (Hind. *bābū;* Canarese *bābū,* father). A Hindu title of respect equal to "Mr." or "master" in English, given in India to educated and wealthy natives or persons of distinction, but used nowadays by Anglo-Indians in a slightly disparaging sense, implying merely superficial cultivation, or simply intended to designate a native clerk who writes English.

**BABOON,** băb-ōōn' (OF. *baboin,* Fr. *babouin,* ML. *babewynus;* cf. Ger. *Pavian;* origin unknown). An African or Arabian cercopithecid monkey of the "dog-faced" genus *Cynocephalus.* Baboons are of large size, covered with long, dark hair, and have very large, brilliantly colored callosities upon the buttocks; but are chiefly distinguished by the elongated, blunt muzzle, with the nostrils in the end, giving the profile a resemblance to that of a dog. This is heightened by the prominence of the canine teeth, which in adult males become most formidable tusks, effective against the largest of their enemies among the wild beasts. This physiognomy, often gaudily colored, is repulsive and fear-inspiring and seems to indicate the fierceness of their character; yet baboons rarely, if ever, have attacked human beings unprovoked. The fore and hind limbs in this group are of similar size, so that they walk easily and gallop swiftly on the ground and move about rocks with extreme agility; they climb trees with greater difficulty, and as a rule keep on the ground and away from forested regions. All the species are gregarious, assembling in large troops, conducted and guarded by the elders, who are exceedingly watchful against danger. They feed mainly on fruits, berries, buds, roots, and the soft wood of certain trees, but vary this fare with insects, grubs, snails, bird's eggs, lizards, etc. By raiding plantations in troops they may do immense damage to crops, ruthlessly destroying more than they eat, and stuffing their capacious cheek pouches full of food to carry away. Such bands are too formidable to be easily driven away by half-armed natives. Baboons are rarely hunted for sport, and still less often captured, though partly domesticable when young; and the ancient Egyptians seem to have trained them to pick fruit, etc. Nevertheless, no monkeys are less tractable or fierce than these; and in the safety of large troops they will resist and sometimes vanquish even the leopard. In fighting they usually stand erect, but otherwise keep always upon all fours. Of the various species the following are best known:

ARABIAN, or SACRED BABOON, or HAMADRYAD (*Cynocephalus* or *Papio hamadryas*). This is the great ashy-gray baboon, represented upon Egyptian monuments and supposed to have been the monkey to which divine honors were paid under the name Anubis. The worship of baboons, according to Petrie, was due to the solemn faces of these animals, which gained them credit for great wisdom, and also to their habitual activity at sunrise, leading to the supposition that they were then adoring the sun god. The body was frequently embalmed, and baboon mummies are still found. It lives in Arabia, but more commonly in Abyssinia and the Sudan, where, in open rocky regions, it congregates in herds sometimes numbering 250, and where its habits have been described at length by Sir Samuel Baker. The huge grizzled mane so characteristic of this species belongs to the old males alone. A closely allied species or variety of Abyssinia (*Cynocephalus* or *Papio doguera*) is yellowish-olive in color.

THE CHACMA (*Cynocephalus* or *Papio porcarius*) of South Africa is even larger, being about the size of a mastiff and exceedingly strong; it is still common on the mountain and sea cliffs of the wilder parts of Cape Colony, going in troops, which might be dangerous to humanity were they not so timid. This species is dark-brown, with long shaggy hair, but without any mane, and the naked part of the face is purplish. The tail is rather more than half the length of the body and is terminated by a tuft of long black hair. Their food is as miscellaneous as that of other species, but they are especially fond of an iris-like bulb known as *ixia,* which they dig and peel before eating. This is the species most often seen in menageries, but all

# BABOONS




1. ARABIAN OR SACRED BABOON (Papio hamadryas).
2. MANDRIL (Papio sphinx).
3. CHACMA (Papio porcarius).
4. GELADA BABOON (Theropithecus gelada).
5. ANUBIS BABOON (Papio anubis).
6. DRILL (Papio leucophæus).

the others endure captivity well. Several of them are usually to be seen in the New York Zoological Park.

Five other species of baboons are limited in their range to West Africa. One is the olive-green ANUBIS (*Cynocephalus anubis*), which is the species reported by Hanno, about 500 B.C., under the name "gorilla"; another is the edible YELLOW BABOON (*Cynocephalus babuin* or *Papio cynocephalus*); a third the reddish-brown GUINEA BABOON (*Cynocephalus sphinx* or *Papio papia*), long familiar in the hands of showmen, yet almost unknown in its native state; the others are the hideous, short-tailed drills.

The MANDRILL (*Cynocephalus mormon* or *Papio sphinx*) is the largest of all baboons, has comparatively short limbs, a mere stump of a tail carried erect above scarlet callosities, and a massive and powerful body. The head is of enormous size, crested and bearded, and there is scarcely any forehead, while the deeply sunken eyes give a morose expression. The fur about the head, rising into a crest upon the occiput, is greenish black, but the beard is orange-yellow, and between them is a huge nose, vastly swollen on each side, folded into ribs colored light blue and divided and tipped with scarlet. The ugliness of its aspect is borne out by the disposition of this brute, which is one of the most formidable and ferocious creatures of the Gaboon forests. Another West Africa baboon is the DRILL (*Cynocephalus leucophæus*), which is somewhat less in size than the mandrill, and lacks the colors and great swellings of the nose, but is otherwise similar to it.

The GELADA "baboon" is a large maned monkey (*Theropithecus gelada*), of southern Abyssinia, which has the appearance of a black, clipped French poodle, and the habits and temperament of a true baboon. See APE; MONKEY; and Plate of BABOONS. Consult Elliot, *A Review of the Primates* (New York, 1913).

**BA'BRIUS.** A Hellenistic fabulist. He was probably of Italian origin, as his name and Latinisms indicate, but he seems to have lived in the East, perhaps in Syria. He lived, apparently, in the third century A.D. He worked over, in choliambic metre, a large collection of Æsopic fables. In the later centuries of antiquity and the earlier Byzantine period this compilation was very popular and supplanted all previous collections. Suidas, about the tenth century, possessed the work in 10 books, but his text was more corrupt than that we now have. During the Renaissance and modern times the work existed only in paraphrases and fragments, which were current under the name of *Æsop's Fables*. In 1697 Bentley found in the current fables of Æsop verses which he ascribed to Babrius. Tyrwhitt, in his *Dissertatio de Babrio* (1776), published a number of verses recovered from the prosaic paraphrases of Suidas; and in 1842 a Greek, Minoides Minas, discovered a manuscript in the monastery of St. Laura on Mount Athos which contained 123 fables, arranged in alphabetical order, showing that at least one-third the original collection had been lost. This manuscript is now in the British Museum. Fifteen years later Minas brought out 95 additional fables, which he claimed to have discovered in another manuscript; they are, however, now universally recognized as forgeries. In 1877 Knöll recovered more new fables from a manuscript in the Vatican Library; and in 1891 Van Assendelft secured in Palmyra seven wax tablets containing fables not hitherto known. These are now in the library at Leyden. Of editions the best is by Crusius (Leipzig, 1897); another is by Rutherford (London, 1883). Consult: Conington, *Miscellaneous Writings*, vol. ii (London, 1872); Fusci, *Babriano* (1901); Christoffersson, *Studia de Fabulis Babrianis* (1901).

**BABSON,** ROGER WARD (1875– ). An American statistician, born in Gloucester, Mass., and educated at the Massachusetts Institute of Technology, from which he graduated in 1898. He organized and became president of a statistical organization with branch offices in the largest cities of the United States and in London. In addition, he undertook the publication of *Moody's Manual of Railroad and Corporation Securities*. The Massachusetts Institute of Technology appointed him lecturer on statistics and economics, and as a writer on these subjects several newspapers and weekly journals employed his services. His writings in book form include: *Business Barometers* (1909); *Selected Investments* (1911); *Bonds and Stocks* (1912); *Commercial Paper*, with Ralph May (1912); *The Future of the Working Classes* (1913).

**BABU.** See BABOO.

**BABUR.** See BABER.

**BABUYAN** (bä'bōō-yän') **IS'LANDS** (Malay, "pig" islands). A group of islands in the Pacific, forming a portion of the northern part of the Philippine archipelago (Map: Philippine Islands, F 2). They are situated between Luzon and the Batan group, between 18° 40′ and 19° 40′ N. lat. and 121° and 122° E. long. The chief islands are Kamiguin, 65 square miles; Babuyan Claro, 38 square miles; Calayan, 30 square miles; Dalupiri, 20 square miles; and Fuga, 21 square miles. They are of volcanic origin, and indicate comparatively recent activity. Including the Batan group, the population, according to the latest available estimate, was 12,000. The natives, Ibanags or Cagaynes, are the finest races of the Philippines. Tobacco, grain, rice, and tropical products are grown. There are some pineapples and wild grapes. The inhabitants are concerned chiefly with the raising of cattle, hogs, and horses, which, with lard, form the principal articles of export. Musa, on the south shore of the island of the same name, is the most important town.

**BAB'YLAS, or BAB'YLLUS,** SAINT (?–250). A Bishop of Antioch, from about 237 to 250. He refused to admit to public worship the Emperor Philip, who, to obtain the throne, had murdered the young Gordianus. In the persecutions under Decius he was cast into prison and there died. His day in the Roman calendar is January 24, and in the Greek, September 4.

**BABYLON** (Gk. Βαβυλών, Bab. *Babilu*, Heb. *Babel*, Eg. *B-b-l*, Arab. *Babil*). The capital of Babylonia from the time of Hammurapi (2124–2081 B.C.) to the end of the Chaldæan Empire (539 B.C.). Its Sumerian name was *Ka-dingir-ra*, of which the Akkadian equivalent was *Babilu* (*bab*, 'gate,' and *ilu*, 'god'). It was also called *Tin-tir*, 'grove of life,' and *E-ki*, 'dwelling place.' The ending *on* may be of Greek origin, as in Καρχηδών, *Karchēdōn*, 'Carthage,' or possibly go

back to a local pronunciation, *Bab-ilani*, 'gate of the gods.' In Gen. xi. 9 Babel is explained as derived from *balal*, 'confound,' a name supposed to have been given to the city because the confusion of tongues took place there; but this folk etymology has no scientific value. (See BABEL, TOWER OF.) The ancient site of the city is represented by the villages of Kuwairish and Jimjima, on the eastern bank of the Euphrates, and Sanjar, on the western, as well as by the mounds named Babil, Kasr, Mujelliba, Ishan Amr ibn Ali, Ishan al Aswad, Ishan al Hamra, and Markaz, all on the eastern bank (Map: Turkey in Asia, L 6). Its exact location is 32° 34′ 30″ N. lat. and 44° 23′ 30″ E. long.

The city existed already in the time of Sargon of Agade (c.3790–3750 B.C.), who cleared the land around the *Tuna*-gate, built a palace, introduced the Anunit cult, and seems to have given to the place its Akkadian name, Babilu. For some centuries it must have had a prevailingly Akkadian population, since the Semitic god Nabu appears to have established for himself a position of such strength that it had to be recognized even in later times, when the Sumerian god Marduk had become the chief deity of the city. It is possible that a dynasty from Eridu established itself in Babylon, between the third dynasty of Uruk and Ur Engur of Ur, with Marduk, the son of Ea of Eridu, as its god. The Amoritish dynasty of Sumuabu seems to have come from Sippara. During his successors Babylon grew in importance until in 2094 B.C. Hammurapi's conquest of Larsa made it the capital of all Babylonia. The city was captured by Gandash in 1671, by Tiglath Ninib c.1262, by Tiglath-pileser I (1140–05), by Shalmaneser III in 851, and by Tiglath-pileser IV in 729. It was destroyed by Sennacherib in 689. After razing the palaces, temples, and other buildings, he let loose the waters of the Euphrates through the Arachtu Canal over the city so as to make it uninhabitable. It was rebuilt by Esarhaddon (681–668) and Samassumukin (668–648), but suffered at least partial destruction when Asurbanipal captured it from his rebellious brother. Babylon was enlarged and beautified by Nabopolassar (625–605) and Nebuchadnezzar (605–562). It became one of the capitals of the Achæmenian Empire, and Seleucus I Nicator resided there until he deemed it expedient to remove the seat of government to a place nearer the Mediterranean, and it soon yielded in importance not only to Seleucia and Antioch on the Orontes, but also to the Seleucia that grew up on the Tigris. Babylon was taken by the Parthian King Mithridates VII c.150 B.C., and Ktesiphon became a new formidable rival. The remains of a Greek theatre under the mound Al Hamra show that the city continued to flourish in the Hellenistic period. The Sasanid kings are said to have resided there at times. Even after the founding of Bagdad Babylon remained the capital of a district, as Ibn Serapion testified c.900 A.D. Later it became simply a village. The name remained attached to what at present is the northernmost mound, while the town of Hilla, which now has a population of c.20,000, grew up farther south.

Pietro della Valle, in 1616, recognized the ruins north of Hilla and near Jimjima as those of Babylon. They were visited by Beauchamp in 1784, by Rich frequently between 1811 and 1817, and by Robert Ker Porter in 1818. Layard began the work of excavation in 1850, but he continued only a few weeks; Fresnel and Oppert remained over three years (1851–54), Hormuzd Rassam in 1880 only a short time. The real work has been done by the Deutsche Orient Gesellschaft, under the leadership of Koldewey, since 1899. He was able to trace the outermost wall, showing that the city extended over an area of about 12 square miles, consequently was far smaller than Herodotus (i, 178–187) represents it when he gives it a circumference of 480 stadia, i.e., about 55 miles, and had very nearly the extent assigned to it by Alexander's historians of 90 stadia, or c.10 miles. Very much smaller was the Babylon inclosed within the two oldest walls, the Imgur Bel and the Nimitti Bel, which have been found. Koldewey laid bare the Processional Street, *Aiburshabum*, the Ishtar Gate, the foundations of two palaces of Nebuchadnezzar, the quays, the Marduk Canal, the great Marduk temple, *E-sagila*, the whole in the ground now called *El Sahan*, where stood the famous Tower of Babel (q.v.), the *E-temen-anki*. Numerous objects of art have been found and a large number of inscriptions from different times. As a result of these excavations, it is now possible to understand the allusions to walls and gates, streets and towers, temples and palaces in the cuneiform inscriptions. No archive has yet been found in any temple or palace of Babylon such as those that rewarded the search of excavators at Sippara, Lagash, and Nippur. The city of Hammurapi's time could not compare in extent and magnificence with the splendid capital of which Nebuchadnezzar is represented as having said, "Is not this Babylon the Great?" It is this city that is coming to light, while little remains from the earlier periods of its history.

Consult: Weissbach, *Das Stadtbild von Babylon* (1904); Winckler, *Geschichte der Stadt Babylon* (1904); Koldewey, in *Mitteilungen der Deutschen Orient Gesellschaft* (1899–1913); id., *Das wiedererstehende Babylon* (1912); King, *A History of Sumer and Akkad* (1910); Baumstark, "Babylon und Babylonien" in Pauly-Wissowa, *Realencyclopädie* (1894– ); Herzfeld, article "Babil" in *Enzyklopaedie des Islam* (1911).

**BABYLON.** A village in Suffolk Co., N. Y., incorporated in 1894; 37 miles east of New York City, on Great South Bay, here crossed by steam ferry to Fire Island and Oak Island Beach, and on the Long Island Railroad (Map: New York, B 3). The village is a popular summer resort, having an admirable beach, and good fishing. The surrounding region is adapted to general farming. Pop., 1900, 2157; 1910, 2600; 1913 (est.), 2650.

**BABYLO'NIA** (Gk. Βαβυλωνία, Heb. *Babel*, Pers. *Babiru*). The name given by Greek writers to the country whose capital they called Babylon (q.v.). It corresponds to the modern Irak al Arabi (q.v.), including the vilayets of Bagdad and Basra so far as the latter existed in ancient times. On the west the boundary line ran along the Arabian Desert; on the north the country reached to the neighborhood of Bagdad about 33° 30′ N. lat.; on the east the territory spread beyond the Tigris toward the Zagros Mountains; and the southern limit was marked by the Persian Gulf, which, however, extended much farther north than at present, as there has been a constant growth of the land. As a satrapy of the Achæmenian Empire it was called Babiru, corresponding to Babilu, and in an addition to the Book of Jeremiah (l. 28), it is referred to as "the land of Babel." In earlier

times the inhabitants themselves do not seem to have used the same designation for the capital and the country as the Assyrians did in the case of Assur (q.v.). The reason was that, before Babylon became the chief city, other names had already come into vogue. The Sumerians spoke of the region where they dwelt simply as *Kiengi*, 'the land.' It is possible that North Babylonia became known as Akkad after the Semitic Akkadians had established a strong dynasty at Agade (see ACCAD), and that south Babylonia was then referred to as Sumer. At any rate, the whole country was designated as "Sumer and Akkad" in the title of Ur Engur and his successors in the control of Babylonia, whatever their nationality. The Kassites often used the name "Karduniash," and that was also employed by the Hittite King Hattusil in one of the Boghaz Keui letters (see HITTITES). In the Old Testament the designations most frequently used are Shinar and "the land of the Kasdim." As regards the origin of the former there is much difference of opinion. Since Babylon and Accad as well as Erech and Calneh (Nippur?) are assigned to Shinar, the name would seem to include both Sumer and Akkad. If Shinar is derived from Sumer, it must be supposed to go back to a period of Sumerian supremacy previous to Ur Engur, or even Sargon of Agade, when the whole country could be called Sumer, as in the days of Asurbanipal it was called Akkad. On the other hand, Shinar may be identical with the Sangara of the Egyptians and the Sanhar of the Tell el Amarna tablet xxv, 49, but it is not clear where these names originated or what they represented. Consult Landersdorfer, "Das Land Shin'ar," *Biblische Zeitschrift* (1913). The Kasdim are Kaldu, or Chaldæans, and their country, also called *mat tamti* and *mat marrati*, was the southernmost part of Babylonia, on the Persian Gulf. As the last native dynasty was Chaldæan, the Greeks often used the name Χαλδαία, Chaldæa, for the whole country.

**Physical Features.** Babylonia is an alluvial plain created by the deposits of the Euphrates and the Tigris. The present rate of increase is about a mile in 70 years. It is not known whether it has been uniform in the past. As Mohammerah was on the gulf in Alexander's time, it cannot have varied greatly since then. While it would be hazardous to affirm on this basis alone that no part of Babylonia existed 25,000 years ago, it is not improbable that this is the case. On the other hand, there is reason to believe that almost two-thirds of the present surface of Babylonia had risen above the waters at the time when our earliest inscriptions were written. But each of the two rivers then entered the gulf at a separate mouth; Shatt el Arab did not yet exist. The great fertility of Babylonia was due to a network of canals that was carefully kept up and to the systematic irrigation of the soil. Embankments and trenches are found everywhere, indicating the course of these ancient canals. As the result of long neglect there are to-day large tracts of land that are either swamps or deserts. In ancient times this plain yielded rich returns to the farmer. As long as the annual inundations of the Euphrates and the Tigris were under control, and the waters were properly led to the fields, he could count upon enormous crops. Wheat was the principal product, but barley, millet, and vetches were also cultivated in large quantities. Dates furnished wine, vinegar, and flour for baking; the sap of the date tree gave palm sugar, and ropes were made from the bark. The vine and such fruits as apples, oranges, and pears were also cultivated. Among domestic animals may be mentioned camels, oxen, sheep, goats, horses, and dogs; among wild animals, lions, wild oxen, wild boars, jackals, hares, and gazelles; there was a great variety of birds, and an abundance of fish in the rivers.

**Ethnology.** The population of Babylonia seems at all times to have been very mixed. We have no means of knowing who first inhabited the strip of land between the two rivers available for settlers in the Neolithic Age. They may have been Semites, Sumerians, Anzanites, or Negritos. De Morgan thinks that Negritos descending from some Pleistocene race were the first to enter the country, but that the first real settlers were the Sumerians (*Les premières civilisations*, pp. 192 ff., 1909). In a careful study of the representations of Sumerians and Akkadians by the ancient artists, Ed. Meyer reached the conclusion that the Akkadians preceded the Sumerians in Babylonia (*Sumerier und Semiten in Babylonien*, 1907). He based his view partly upon the assumption that Nippur was an Akkadian cult centre, partly on the representation of their gods by the Sumerians with long hair and beard, like Semitic gods, though they shaved their heads and faces themselves. This theory has been accepted by Caetani, *Studi di Storia Orientale*, i, 145 ff. (1911), who modifies it by assuming two Semitic invasions—one before, and another after, the Sumerian conquest, and by Jastrow, *Die Religion Babyloniens und Assyriens*, Vorwort, ix ff. (1912) who emphasizes the coöperation of the two races in developing Babylonian civilization. But Clay has shown (*Am. Journ. of Sem. Lang.*, 1907) that the name of the god of Nippur was always pronounced Enlil or Ellil, not Bel, and Meyer has subsequently (*Geschichte des Altertums*, i, 2, 2d ed., p. 407, 1909), recognized that "Nippur always was a Sumerian cult centre." His arguments from hair, beard, and manner of dress have not been regarded as convincing by Langdon, "Sumerians and Semites in Babylonia" in *Babyloniaca*, vol. ii (1908) and King, *A History of Sumer and Akkad*, pp. 40 ff. (1910). Bearded Sumerians appear upon some of the earliest monuments, and they may well have represented their gods with hair and beard, not because their enemies, the Semites, represented them thus, but because their ancestors made these gods in their own image before they adopted the custom of shaving off the hair and the beard. The theory of De Morgan seems at present most probable, and it is more likely that the Sumerians came down the Adhem and the Diyala from the northeast than that they came by sea from the south. Concerning the ethnic relations of the Sumerians nothing is as yet known. The difference in language cannot be urged against a connection with the Anzanite stratum in Elam or the early population around Lake Van, since widely differing languages of the agglutinating type are found among people of the same racial stock. (See SUMERIAN LANGUAGE.) Whether the setting of the eyes in the finely chiseled heads of the Gudea period indicates a Mongolian origin is uncertain. If the Sumerians descended from the Zagros Mountains in the Neolithic Period, they are likely to have come from some region north of the high plateau of Iran. The Akka-

dians were Semites, entering the land probably from northeast Arabia. The representation of Naram Sin in high relief presents the type very clearly. Amoritish tribes seem to have pushed their way into Babylonia long before Sumuabu (2232–2217). The first dynasty of the city of Babylon known to us was Amoritish. (See AMORITES.) The racial connections of the Kassites are doubtful; but the occurrence of Shuriash (Sanscrit *Svarya*, the 'sun') in Kassite names suggests that there was an Iranian element among them as among the Mitannians (q.v.). Numerous Aramæan tribes occupied the plains east of the Tigris and between the two rivers in the south. (See ARAMÆANS.) Whether the Chaldæans (*Kaldu*, Heb. *Chesed*, *Kasdim*) originally formed one of these cannot be determined, but is suggested by Gen. xxii. 22. The Chaldæan kings of Babylon assumed names compounded with Marduk, Nabu, and Nergal, and had their inscriptions written in Babylonian. We have no inscriptions from Bit Yakin. Elamites (see ELAM), Gutians (see ARRAPACHITIS), Medes, and Jews, at least from 597, when the 10,000 exiles were placed on the river Chebar (Kubaru, the canal of Nippur), and 586 and 581, when several thousand more were deported from Jerusalem to Babylonia, helped to swell the population.

**Cities.** The chief cities in northern Babylonia were Opis, the seat of the earliest-known dynasty, first called Kesh, then Upi, whence the Opis of Xenophon, situated on the Adhem, near the Tigris, not yet identified with any existing mound; Agade (see ACCAD), not far from Sippara, and possibly identical with Sippara of Anunit, not yet identified; Sippara of Shamash, the modern Abu Habba, on the Euphrates; Dur Kurigalzu, the modern Akarkuf, built in the Kassite period; Cutha (q.v.), the modern Tell Ibrahim, northeast of Babylon; Kish, the modern Tell el Uhaimir, east of Babylon and its twin city Charsagkalama; Babylon (q.v.) north of Hillah; and Borsippa (q.v.), the modern Birs Nimrud, opposite Babylon, west of the Euphrates. In southern Babylonia the most important cities were Nippur, the modern Nuffar on Shatt el Nil; Adab, the modern Bismaya, between Shatt el Hai and Shatt el Kur; Kisurra, the modern Abu Hatab, west of Shatt el Kur; Shuruppak, the modern Fara, a short distance southeast of Kisurra; Umma, the modern Jocha, east of Shatt el Kur; Dur gurgurri, probably the modern Tell Sifr; Uruk, the Erech of the Hebrews, the modern Warka, between Shatt el Kur and the Euphrates; Larsa, the modern Senkera farther south; Lagash, the modern Tell Loh, on Shatt el Hai; Uru, the Ur of the Chaldees, the modern Mukayyar, west of the Euphrates; and Eridu, the modern Abu Shahrein, farther south. The important city of Isin has not yet been identified, nor the northern Charsagkalama, nor Anu; and the ancient names of the cities buried under the mounds of Hamam, Lamlun, Hatra, Hetima, El Jidr, El Hibba, Surghul, Tell Id, Tell Medain, and Tell Lahm have not been discovered.

**Excavations.** Sippara (see SEPHARVAIM), discovered by George Smith, was excavated in 1881 by Hormuzd Rassam, who secured some 60,000 tablets, among them the famous Nabunaid inscription giving the date of Naram Sin, and in 1902 by Scheil. Excavations were carried on by Rassam at Cutha in 1881 without important results. Oppert and Fresnel undertook for a brief period excavations at Kish in 1852. Most thoroughgoing excavations have been carried on by the Deutsche Orient Gesellschaft under the leadership of Koldewey at Babylon from 1899 to the present time, resulting in the discovery of many inscriptions and objects of art as well as in a greatly increased knowledge of the city as it was rebuilt by Esarhaddon and beautified by Nebuchadnezzar, with its palaces, temples, quays, streets, and walls. Some excavations were undertaken by Rassam at Borsippa in 1881. At Nippur excavations were begun by Layard in 1851. After a tour of reconnaissance by Ward in 1885, the city was thoroughly excavated by Peters in 1888 and 1890, by Haynes in 1893, and by Hilprecht in 1898 and 1900 for the University of Pennsylvania. A very large number of inscriptions were found, numerous objects were obtained, and temples and buildings from different periods examined. Adab was excavated by Banks in 1902–03; Shurrupak, which goes back to Neolithic times, and Kisurra were in part excavated by Koldewey in 1902; Loftus excavated at Dur gurgurri in 1854, at Uruk in 1850 and 1854. Most extensive and systematic excavations were conducted for the French government by De Sarzec at Lagash from 1877 to 1901 with some interruptions, and later by Cros, resulting in the discovery of a temple archive containing about 30,000 inscribed clay tablets, many thousand tablets in other parts of the mound, a vast number of objects of art, among them the remarkable Gudea statues, and an acquaintance with an ancient Sumerian city that had a very long history. Koldewey examined Surghul and its necropolis and El Hibba in 1902, and Hatra in 1912. Taylor conducted excavations at Ur and Eridu in 1854–55. Especially the excavations at Lagash, Nippur, and Babylon have been of great value; but at these places as well as in scores of mounds covering ancient Babylonian cities there is an enormous amount of work yet to be done.

**Chronology.** Our knowledge of Babylonian chronology is based upon (1) lists of kings and dynasties, (2) chronicles, (3) references to dates of earlier kings by their successors, (4) documents dated in the years of various kings, (5) synchronisms with rulers in other lands, (6) excerpts from the history of Berosus, (7) Ptolemy's *Almagest*, and (8) dates that can be fixed astronomically. We possess at present a number of lists of dynasties and kings with regnal years and the sum total for each dynasty. The most important of these are a list of the dynasties of Opis, Kish, I Uruk, Agade, and II Uruk, published by Scheil in *Comtes rendus de l'Académie des Inscriptions et Belles Lettres*, pp. 606 ff. (1911); a list of the dynasties of Ur and Isin, published by Hilprecht, in *Babylonian Expedition of the University of Pennsylvania*, xx (1906); a list of 10 dynasties of Babylon, published by Pinches in *Proceedings of the Society for Biblical Archæology*, vi. 193 ff (1884), and a list of the first two dynasties of Babylon, also published by Pinches, id., i, 20 ff. (1880). The Babylonian Chronicle, written in the time of Darius I, was published by Pinches in 1884, and is given with a translation in Rogers, *Cuneiform Parallels to the Old Testament* (1912); and valuable data are found in *Chronicles concerning Early Babylonian Kings*, published by King in 1907. Important references

are made to the time when earlier kings reigned, e.g., by Nabunaid, who states that Naram Sin laid the foundation stone of the temple of Shamash in Sippar 3200 years before him, or about 3750 B.C., that Hammurapi lived 700 years before Burnaburiash (1381–1357), consequently in 2081, and that Shagaraktishuriash reigned 800 years before his time, i.e., about 1350; by Ellilnadinbal (about 1140) that Gulkishar reigned 696 years before him (c.1840); by Sennacherib that two images were found when he destroyed Babylon in 689 which had been taken from Tiglath-pileser I 418 years before, or in 1107; and by Asurbanipal that Kudur Nanchundi carried away Nanai from Uruk 1635 years ago, i.e., 2280 B.C. Dated documents, of which there is a very great number, often help to check the figures in the lists. Aside from the invaluable Synchronous History (Peiser and Winckler, in *Keilinschriftliche Bibliothek*, 1889) and the Babylonian Chronicle, it is important for the chronology that Burnaburiash of Babylon was the contemporary of Dushratta of Mitani, Subbiluliuma of Hatti, and Amenhotep III and Amenhotep IV of Egypt, as the Tell el Amarna Letters (q.v.) show; that Kadashman Turgu and Kadashman Ellil of Babylon were the contemporaries of Hattusil of Hatti and Rameses II of Egypt, as the Boghaz Keui tablets show (consult Winckler in *Mitteilungen der Deutschen Orientgesellschaft*, No. 35 (December, 1907); that Sumuabu was a contemporary of Ilusuma of Assyria, Ilumailu, the founder of the second dynasty of Babylon, a contemporary of Hammurapi's son, Samsuiluna, and Kashtiliash I of the third dynasty of Babylon, a contemporary of Eagamil, the last king of the second. Berosus evidently used lists of kings so far back as to the beginning of Sumuabu's reign, and the date he assigns for the first Babylonian dynasty is now recognized as correct; but the principle on which he arranged his dynasties has not yet been found and does not agree with that obtaining in our cuneiform inscriptions. Ptolemy's Canon gives a fixed starting point in the era of Nabunazir (747) and valuable astronomical data. The accuracy of his list of kings is proved by the lunar eclipses he records, as Zech has shown (*Untersuchungen über die Mondfinsternisse des Almagest*, 1851) and the accuracy of the date given by Berosus for the first dynasty is proved by observations of the appearance of Venus made in the twenty-first year of Ammizaduga, as Kugler has shown (*Sternkunde und Sterndienst in Babel*, ii, 2, Heft 1, 1912).

While there are still some kings who cannot be dated and some dates that are not certain, the chronology of the period from 2232 to 539 has been in the main established. As we advance beyond the former date, three problems present themselves. The first concerns the end of the dynasty of Isin. If the conquest of the city by Rimsin of Larsa marks the end, and this conquest is identical with the fall of the city in the seventeenth year of Sinmuballit, then Ur Engur, the founder of the dynasty of Ur, began his reign in 2469, as Ed. Meyer maintains in *Sitzungsberichte der k. preussischen Akademie der Wissenschaften*, p. 1064 (1912). On the other hand, if the dynasty of Isin immediately preceded the first dynasty of Babylon, Ur Engur's date would be 2574. Much speaks in favor of the latter view, but it is by no means certain. The reliability of Nabunaid's date for Naram Sin constitutes the second problem. A textual error of 3200 for 2200 has been supposed; but such an arbitrary change of the document is generally regarded as unmethodical. It has been suggested that Nabunaid's scribes may have based their calculations on the precession of the equinoxes, and reckoned each degree at 100 years instead of 72. The assumption was that there could not have been at the time of Nabunaid lists of kings with their regnal years covering more than 3000 years. Yet it is admitted that very accurate lists must then have existed, going back to Sumuabu, covering over 1680 years, or more than half of the distance; the recently published lists for times earlier than Sumuabu give 1275 years; Hilprecht (l.c.) estimated that there must have been about 135 names before that of Ur Engur in the lost part of the broken tablet, and there is now no reason to suspect any of these to have been mythical. It is extremely improbable that contemporaneous dynasties were counted as successive; in the case of the second dynasty of Babylon the supposition proved mistaken. But an occasional overlapping of dynasties is very probable, though the Babylonian scribes seem to have been aware of this and taken account of it. When new lists of kings and dynasties formerly unknown are thus appearing from time to time, much weight cannot be given to the absence of documents for the centuries between the Gutian conquest and Ur Engur. Ed. Meyer points out that we have not a single tablet or document of any kind for half a thousand years, from 1925 to 1381. Only future discoveries can decide the trustworthiness of Nabunaid's statement, but in the light of recent finds it would seem more correct to accept it tentatively than to assign to Naram Sin arbitrarily a much later date, without any evidence and in the face of a positive testimony likely to be based upon the simple addition of a score of figures. The third problem is connected with the dynasty of Kish, which is given 586 years, but only eight rulers, the first of them a queen credited with 100 years. Some scholars accept only the eight rulers with the 192 years ascribed to them, and besides are inclined to doubt the length of Queen Azag Bau's reign, while others, like Hrozny in *Wiener Zeitschrift für die Kunde des Morgenlandes*, pp. 143 ff. (1912), assume the correctness of the sum total. In favor of Hrozny's view is the fact that we know quite a number of kings of Kish clearly belonging to the period before Sargon of Agade not mentioned in the new list, and among these we should probably count, with Meyer (l.c.), Sargon, Manishtusu, and Urumush. Hrozny, who places Sargon of Agade in 2744, assigns to Unzi, the first King of Opis, the date 3454. If Nabunaid's date for Naram Sin is accepted, Unzi would begin his reign in 4500 B.C.

**History.** *Dynasty of Opis* (c.4500–4401).—Concerning the history of Babylonia before this dynasty we have no positive information. How long the Sumerians had been in the land, whence they came, whether they were preceded by men of a different race, what degree of civilization they had attained, and to what extent, if any, Semitic tribes had pushed their way into the country as nomads or settlers, can only be matters of conjecture. It is significant that this earliest Sumerian dynasty appears in the northernmost town of Babylonia, east of the Tigris.

The regnal years of the six kings are given in the list. They are Unzi (30 years), Undalulu (12), Ursag (6), Basha Sir (20), Ishuil (24), and Shu Enzu (7).

*Dynasty of Kish* (c.4401–3815).—The power passed from Opis to Kish, east of Babylon. Only eight rulers are given in the list: Azag Bau, a woman (100 years), Basha Enzu (25), Ur Zamama (6), Zimudar (30), Uziwidar (6), Elmuti (11), Igul Babbar (11), Naniyach (3). Yet the total number of years for the dynasty is 586. This evidently covers the whole period of the power of Kish. The other Sumerian kings of Kish, such as Utug, Mesilim, Alzu, Lugaltarsi, and Urzage, may have belonged to a different dynasty, as certainly did the Semitic kings of Kish, Enbi Ishtar, Sargon, Manishtusu, and Urumush. During this period a number of prominent patesis, priest kings of Ningirsu, reigned at Lagash, such as Enchegal, Badu, Lugalshag Engur, the contemporary of Mesilim of Kish, Urnina and his lineal descendants, Akurgal, Enannatum I, Entemena, and Enannatum II, and later, Lugalanda, Enliltarzi, Emetarzi, and Urukagina. Enannatum, whose deeds are recorded on the Vulture Stele and in other inscriptions, conquered Alzu of Kish, and received from Ellil, the god of Nippur, sovereign power. The same success seems to have crowned the efforts of Lugalkigubnidudu, patesi of Uruk, who was recognized by Ellil, and made Ur his capital, where also Lugalkisalsi and Enshagkushanna seem to have ruled as "kings of Sumer and the land." This may have been the response of the Sumerian south to the establishment of a Semitic family upon the throne at Kish. But Sargon, Manishtusu, and Urumush were conquerors who made their powers felt everywhere in Babylonia and in Elam.

*First Dynasty of Uruk* (c.3815–3790).—The power of Kish came to an end through Lugalzaggisi. This King was originally patesi at Umma, but took possession of Uruk, was recognized by the Ellil priesthood at Nippur, subdued the north, and made expeditions to Syria, so that he could claim to rule from the Upper Sea (the Mediterranean) to the Lower Sea (the Persian Gulf). He has left a long inscription, recording his victories, copied on a large number of vases.

*Dynasty of Agade* (c.3790–3593).—Lugalzaggisi was overthrown by the founder of the dynasty of Agade. There can be little doubt that this was Sargon I, King of Accad, who conquered Elam, Mesopotamia, the land of the Amorites, and the Gutians, and built temples in Babylon and Nippur. His son, Naram Sin, fought with Magan in Arabia, the Lulubians, and Bit Aram (possibly an Aramæan people), had a statue erected north of Diarbekr, ruled at Susa, as an Elamitish inscription shows, and may have made a raid on Cyprus. His two successors are unknown; after them came Sargon II, Abaiailu, Iliidinnam, Imiilu, Nannumsharru, Ilulukar, Dudu (21 years), and Shukarkab (15). There were 12 kings; the names of the eight last kings and the long duration of the dynasty have been known only since 1911.

*Second Dynasty of Uruk* (c.3593–3567).—The passing of the hegemony to Uruk probably represents a Sumerian reaction. The kings were Urnigin (3 years), Urinar (6), Kudda (6), Bashanini (5), Ur Utu (6). They are otherwise unknown. The dynasty was overthrown by a foreign invasion.

*Gutian Dynasty* (c.3567–?).—The people of Gutium took revenge for their long subjection to Accad and Uruk by ravaging the cities probably under their king, Erridapizir. Whether they ruled from their own capital, Arrapcha, or chose one of the great cities of Babylonia as seat of government, is unknown, as is the duration of the dynasty. It is not impossible that it lasted for centuries, as the Kassite rule at a subsequent period. We have no list of rulers, but Basium, Lasirab, and the last of the kings, Tirikan, are referred to in inscriptions.

*Third Dynasty of Uruk* (unknown date.)—King Utechegal, of Uruk, freed Babylonia from foreign domination. The dynasty was probably of Sumerian origin. How long it lasted cannot be determined.

*Dynasties of Lagash and other Cities* (before 2574).—The patesis who succeeded Urukagina (c.3815) in Lagash were apparently weak rulers and for the most part politically dependent. Only about a dozen are known from the long period preceding Gudea, possibly a fourth of the entire number. There may have been many dynasties, Sumerian and Akkadian, in the last half of the fourth millennium and the beginning of the third, which have not yet come to light. Nor is it possible to give the date of the greatest of all Sumerian rulers, Gudea, of Lagash. It is difficult to believe that Lagash in his time recognized the suzerainty of any other city. Gudea, indeed, never uses the title of king and always calls himself simply patesi; but he never alludes to any other king as his sovereign, he conquered Anshan, and sent out expeditions to Syria and Arabia to secure wood and diorite, and may have prided himself upon his patesi title, designating him as priest king of the god Ningirsu, as some of the earlier Assyrian kings did, who called themselves simply isakku of Asur. (See ASSYRIA.) The statues of Gudea give us the best idea of the Sumerian type. His son, Ur Ningirsu, seems to have retained the same power and independence. It is as yet impossible to say how long a time may have elapsed between him and the patesis Urabba, Galukazal, Urlama, Alla, and Arad Nannar, who were contemporaries of the kings of Sumer and Akkad.

*Dynasty of Ur* (2574–2457).—Under Ur Engur of Ur (18 years) Sumer and Akkad were definitively united, and this union was expressed in the royal title. His descendants were Dungi (58), Bur Sin (9), Gimil Sin (7), and Ibi Sin (25). Of all these kings we possess inscriptions. The patesis of Susa were subject to them, though Ibi Sin was finally taken captive to Susa.

*Dynasty of Isin* (2457–2232).—The power passed from Ur to Isin, a city which it has not yet been possible to identify. The kings were: Ishbi Ura (32 years), Gimililishu (10), Idin Dagan (21), Ishme Dagan (20), Libit Ishtar (11), Amil Ninib (28), Pur Sin (21), Iterkasha (5), Uraimitti (7), Sinikisha (½), Ellilbani (24), Zambia (3), .... (5), Ea.... (4), Sinmagir (11), and Damikilishu (23). Five of these have left inscriptions. During this period King Kudur Nañchundi plundered the temples of the land of Akkad and carried away the goddess Nanai from Uruk (c.2280), brought back by Asurbanipal 1635 years later. The dynasty seems to be of Amoritish origin. A rival dynasty appears to have been established at Larsa, c.2375, whose founder Gungunu was

recognized by Ishme Dagan's son, Enannatum, priest of Nannar at Ur.

*First Dynasty of Babylon*, Amorite (2232–1932).—The city of Babylon, mentioned already in the time of Sargon I of Agade, may have played a more prominent rôle in the centuries intervening between the expulsion of the Gutians and the establishment of the kingdom of Sumer and Akkad than our fragmentary sources reveal. An Amoritish chief Sumuabu (2232–2217) founded the first known dynasty of Babylon. His son Sumulailu (2217–2181) greatly extended the power of this city kingdom which maintained itself during his successors Sabu (2181–2167), Apil Sin (2167–2149), and Sinmuballit (2149–2124). The greatest ruler of the dynasty was Hammurapi (2124–2081). At the beginning of his reign he probably recognized the suzerainty of the Elamitish king Kudur Mabuk, and it is not improbable, though it cannot be strictly proved, that he accompanied another Elamitish king, Kudur Lagamar (see CHEDORLAOMER) on a raid into Syria, as is suggested by Gen. xiv. 1 (see AMRAPHEL), some time before 2094, when he succeeded in overthrowing Rim Sin (probably Erim Aku, see ARIOCH), the son of Kudur Mabuk, who had succeeded his older brother Arad Sin as King of Larsa. Already in 2118 he had captured Uruk and Isin, and in 2114 he seems to have made Samsi Adad I of Assyria a vassal. There is no direct evidence that he ruled over either Syria or Elam. He devoted much time to the inner administration of his kingdom, on which his private correspondence with Sinidinnam, a friend and high official, especially throws light. In his famous law book (see HAMMURAPI, CODE OF) he not only vested with his authority many laws of Sumerian origin, already codified in the days of Urukagina, of Lagash, and others of Akkadian origin, but manifestly added many regulations made necessary by the recent development of commerce and industry. His ambition appears to have been to establish justice in the land as a righteous king. Samsuiluna (2081–2043) fought successfully with Ilumailu, a descendant of the old royal family of Isin, but could not prevent him from establishing himself as king in the Sea Country, north of the Persian Gulf. In 2072 he won a victory over a Kassite army. Abeshu (2043–2015) was also unable to subdue Ilumailu. During the reigns of Ammiditana (2015–1978), Ammisaduga (1978–c.1963), and Samsuditana (1963–1932) the power of the dynasty dwindles. The Hittites invade the country and put an end to the Amoritish kingdom, plunder Babylon, and the rival dynasty in the south, having gradually extended its territory, is ready to seize the capital itself.

*Second Dynasty of Babylon*, from Sheshazag, or the Sea Country (1932–1761; in the south 2079–1711).—It is not improbable that the Hittites established Damkiilishu on the throne of Babylon in 1932, as a Sumerian vassal. He counted his dynasty as beginning with Ilumailu (2079–2019) and therefore including his father Ittiilinibi (2019–1964) and his own reign from the time when he became king in the Sea Country (1964–1928). Ishkigal (1928–1913), Shushi (1913–1886), Gulkishar (1886–1831), Peshgaldaramash (1831–1781), and Adarakalama (1781–1753) followed him. Gulkishar gave a district of Der to Nina c.1850, referred to by Ellilnadinpal 700 years later. In the reign of Adarakalama the Kasaite invasion took place. The dynasty was evidently driven back to the Sea Country, where Ekurulanna (1753–1727), Melammakurkura (1727–1720), and Eagamil (1720–1711) continued to rule. The last of these kings was a contemporary of Kashtiliash.

*Third Dynasty of Babylon*, Kassite (1761–1185).—Whether Gandash (1761–1745) came from the home of the Kassites in the Zagros mountains or from some district in Babylonia occupied by this people at the time, is uncertain. His successors, Agum I (1745–1723), Kashtiliash I (1723–1701), Ushi (1701–1693), Abirattash (1693–c.1670), Tazzigurmash (c. 1670–1655), and Agum II (c.1655–1625), come more and more under the influence of Babylonian culture. Agum II styles himself King of Kashshu, Padan, Alman, and Guti. He recovered from Khana in Mesopotamia the images of Marduk and Zarpanit that had been carried away by the Hittites three centuries before. The names of at least six kings for the period from 1625 to c.1500 have not yet been supplied. Karaindash in the beginning of the fifteenth century entered into a treaty with Asurrimnisesu of Assyria. There may have been two reigns between Karaindash and Kadashmanharbe I, who corresponded with Amenhotep III (1411–1375). Kurigalzu I also exchanged presents with this Egyptian king. Burnaburiash (1381–1356) married Muballitserua, daughter of Asuruballit I of Assyria, made a treaty with Puzur Asur, but referred to Asuruballit II as his vassal in a letter to Amenhotep IV (1375–1350). His son Karahardash was murdered by the Kassites, but their leader Nazibugash (1356–1355) was deposed by Asuruballit II, who placed on the throne Kurigalzu II, another son of Burnaburiash. Toward the end of Kurigalzu's reign (1355–1333) he captured and plundered Susa, recovering the Dungi tablet, and defeated Adadnirari II of Assyria. Nazimaruttash (1333–1307) continued the war with Adadnirari II. Kadashman Turgu (1307–1290) and his son Kadashman Ellil (1290–1284) maintained friendly relations with Hattusil, the contemporary of Ramses II (1310–1244), as some of the Boghaz Keui letters show. (See HITTITES.) Probably in the year 1290 Kadashman Ellil fought with Shalmaneser I (c.1320–1290). Kudur Ellil (1284–1276) and Shagarakti Shuriash (1276–1263) were still able to defend themselves against Tiglath Ninib, but Kashtiliash (1263–1255) seems to have succumbed, and seven of his regnal years probably belong to Tiglath Ninib as the first Assyrian monarch ruling over Babylonia (c.1262–1255). After his murder, Ellilnadinshum (1255–1254), Kadashmanharbe II (1254–1253), Adadshumiddin (1253–1247), and especially Adadshumusur (1247–1217) kept up the struggle, which ended with a definitive victory over the Assyrians. Melishipak (1217–1202) pursued Ninibpileser to the very gates of Assur. Mardukapaliddin (1202–1189), Zamamaiddin (1189–1188) and Ellilnadinahi (1188–1185) are the last kings of the dynasty.

*Fourth Dynasty of Babylon*, from Isin (1185–1051).—The deliverance from the foreign domination came from Isin. Only a part of the name of the founder has been preserved, Marduk . . . (1185–1168). Two names are missing; then comes Nebuchadrezzar I (c.1160–1140), who conquered Elam and made an expedition into Syria, but was defeated by Asurresisi; Ellilnadinpal I (1140–1117); Marduknа-

dinahi (1117–1105), who won a victory over the Assyrians in 1107; Mardukshapizermati (c. 1105–1095), Adadapaliddin (1095–1073), Mardukahierba (1073–1071), Mardukzer ... (1071–1059), and Nabushumlibur (1059–1051).

*Fifth Dynasty of Babylon,* from the Sea Country (1051–1030).—Descendants of an earlier royal family in Isin seem to have established themselves in the Sea Country, where there apparently was a considerable Kassite element in the population. Shimashshipak (1051–1033) took possession of Babylon. Eamukinzer reigned only five months, and Kashshunadinahi less than three years (1033–1030).

*Sixth Dynasty of Babylon,* from Bit Bazi (1030–1010).—The origin of this dynasty is unknown. The three kings were Eulmashshukinshum (1030–1013), Ninibkudurusur (1013–1010), and Shilanimshukamuna (three months, 1010).

*Seventh Dynasty of Babylon,* Elamite (1010–1004).—The name of the Elamite who captured the throne of Babylon and held it for six years is not given in the list; but another inscription suggests that it may be Eaapalusur.

*Eighth Dynasty of Babylon,* native (1004–753).—Only a few names have been preserved. Nabumukinpal reigned 1004–978; Shamashmudamik and Nabushumishkun I were contemporaries of Adadnirari III (911–890), Nabupaliddin of Asurnazirpal III (885–860), Marduknadinshum of Shalmaneser III (860–825), Mardukbalatsiikbi and Bauahiiddin of Samsi Adad V (825–812).

*Ninth Dynasty of Babylon,* native (753–732).—The founder is unknown. He was followed by Nabushumishkun II. Why Ptolemy's canon begins with Nabunasir (747–734) has not yet found a satisfactory explanation. Nabunadinzer reigned two years, and Nabushumukin a little over a month.

*Tenth Dynasty of Babylon,* Chaldæo-Assyrian (732–625).—This appears in the list not so much as a dynasty as a succession of rulers of different dynasties. Seven such dynasties are mentioned; some well-known Assyrian kings are given peculiar names, and the names of the dynasties do not suggest Assyria. Yet no effort to save national pride could quite gloss over the fact that for almost two centuries Babylonia was ruled by Assyrian kings, most of whom belonged to the Sargonid family. Concerning Ukinzer (732–729) nothing is known. Pulu (729–727) is Tiglath-pileser IV; Ulula (727–722) is Shalmaneser V. The Chaldæan Mardukapaliddin maintained himself for 12 years on the throne (721–709), but must yield to Sargon (709–705). Sennacherib succeeded him, but his authority was set aside first for a month in 703 by Mardukzakirshumi, and then for nine months by Mardukapaliddin (703–702). The attempt to rule through Belibni (702–700) having failed, Sennacherib made his son Asurnadinsum king (700–694). But he was carried away as a captive to Elam, and the King of this country appointed Nergalushezib as ruler of Babylon (694–693); he was captured by the Assyrians, and the Chaldæan Mushezib Marduk was proclaimed King (693–689). Sennacherib quelled this insurrection, and in 689 utterly destroyed the city of Babylon. He governed the country himself until his death in 681. Esarhaddon (681–668) pursued a conciliatory policy in Babylonia and rebuilt the ancient capital. He appointed his son Samassumukin as viceregent in Babylonia. Rebelling against his brother Asurbanipal, Samassumukin found himself unable to hold Babylon and threw himself into the flames of his burning palace in 648. From that time to the end of his life Asurbanipal ruled as king in Babylonia under the name of Kandalanu.

*The Chaldæan Empire* (625–539).—When Asurbanipal died, Nabopolassar (Nabuapalusur) refused to recognize Asuritililaniukin, declared himself independent, and apparently entered into an alliance with Cyaxares of Media and Psammetichus of Egypt against Assyria. Nineveh was saved in 625 by the prompt appearance of Assyria's ally, the Scythian king Madyas, who drove away the Medes and prevented a general defection in Syria or an Egyptian occupation of the land. There seems to have been an understanding between Cyaxares and Nabopolassar that, in the coming division of the Assyrian Empire, Media was to have Assyria proper and her quondam possessions in Asia Minor, while Chaldæa would be free to annex Syria and Egypt. It is not likely that the terms of this deal were officially made known to the court at Sais; but a suspicion of such an agreement may have determined Necho to force the issue in 608. From the standpoint of Babylon he was a vassal of Chaldæa as truly as his grandfather had been of Assyria. After the fall of Nineveh in 606, Nebuchadnezzar (Nabukudurusur), then heir apparent to the throne, met Necho in a battle at Carchemish in 605. He captured Jerusalem in 597 and carried away to Nippur some 10,000 Judæans, and 11 years later was obliged to besiege and partially destroy the city. Though he laid siege to Tyre for 14 years, he was not able to take this city. His Egyptian expedition in 568 seems to have been a mere raid. He was a great builder (see BABYLON) and an energetic administrator. He reigned from 605 to 562, and was followed by his son Amil Marduk (562–560). Nergalsharusur (560–556) was not a descendant of Nabopolassar, but a son-in-law of Nebuchadnezzar, and his son Labashi Marduk was overthrown by Nabonidus (Nabuna'id), who was not a Chaldæan but a native of Babylon. In the beginning of his reign (556–539) the Medes under Astyages attempted to add Mesopotamia to their Assyrian province, but were driven away from Haran by Nabonidus. After the conquest of Media by Cyrus of Anzan in 553, this King occupied himself with Crœsus of Lydia until Sardis fell in 546, whereupon he turned his attention to Babylonia. Nabonidus was a man of sincere piety, who sought by zealous worship of the gods to avert the danger to the state. He rebuilt the ancient temples everywhere in the kingdom, and dug in their foundations for the inscriptions of earlier kings. To the researches of his scribes and the excavations of his officials we are indebted for much information. It is not clear whether Nabonidus removed the images of the gods from other cities to Babylon in order to centralize all worship there or to save them in the capital in case the old sanctuaries elsewhere should fall into the hands of the enemy. As the King failed to attend the great Marduk festivals in Babylon, preferring to live at Tema, and the shrines for the gods brought into the city detracted from the revenues and power of the Marduk priesthood at the Esagila, disaffection and treason naturally set in. The Crown Prince, Bilsharusur (see

BELSHAZZAR) was defeated by the troops of Cyrus at Opis in 539, and in December of that year Gubaru took possession of the city without clash of swords. Nabonidus was permitted to retire into privacy in Carmania; what became of Bilsharusur is not known; Cyrus was solemnly recognized as King of Babylon in 538; he sent back the images to the local sanctuaries; and Babylonia became a province of his empire.

**Government.** It is possible that the *limmu* institution (see ASSYRIA) once existed also in the city states of Babylonia, as it was preserved in the old city of Shuruppak. But the power at an early time centred in the priestly class, and the patesi, or chief representative of the local deity, became the ruler of the community. In the case of the more important centres a twofold development of the patesiate was possible. It might become a kingship over the whole country, or a large part of it, with the recognized hegemony of the metropolis, or it might become a great religious authority whose recognition was necessary for the exercise of sovereignty. Nippur seems to be an example of the latter development. The patesiate might also remain simply a local position. Conquerors like Sargon of Agade, Hammurapi, Agum II, and the Sargonids evidently attached much significance to the proclamation by the oracle of Ellil at Nippur, or the seizing of the hands of Bel-Marduk in Babylon. To some extent the succession of foreign dynasties in Babylonia must have affected the inner administration. But the existence of a written law undoubtedly tended to give stability to the ordinary forms of governmental procedure. An influential bureaucracy furnished a check on the priestly power, and the prestige of the older sanctuaries no doubt limited the power of the Marduk priesthood in Babylon. While it may not be permissible to infer from the Code of Hammurapi that the state always assumed as much authority in regulating all forms of private business, it is probable that this law gives a fair example of what was generally considered the duty of government in Babylonia.

**Art, Science, and Literature.** The excavations, notably those at Lagash, Nippur, and Babylon, have revealed some of the characteristics of Babylonian architecture. Temples and palaces were built for the most part with brick and have been so largely destroyed that nothing but the ground plan remains. But from the foundations and parts of sculptural decoration it is possible in a measure to conjecture what the appearance of temples, zikkurats, or temple towers, and palaces must have been. Sculpture reached among the Sumerians a comparatively high degree of perfection. Entemena's Stele of Vultures, the statues of Gudea, and some representations of animals exhibit excellent workmanship. The Stele of Naram Sin shows that the Akkadians rivaled, if they did not excel, their masters, provided Sumerian artists were not employed in this case. We know nothing of Babylonian painting. In the textile arts the fame of Babylon spread to Egypt and Syria in the middle of the second millennium B.C. The Babylonians also excelled in the glazing of tiles, the cutting of precious stones, and the making of seals and gems.

In mathematics they succeeded, even with their imperfect system of notation, in extracting square and cube roots and in dealing with very small fractions. They invented a system of weights and measures that spread far and wide. They made valuable astronomical observations, including that of the phases of Venus; and they divided the ecliptic into degrees, the year into months of 30 or 29 days, bringing the solar and lunar years into harmony by intercalary months, and the day into hours. There is no evidence, however, that they discovered the precession of the equinoxes. It seems to have been an early belief among them that the position of heavenly bodies had something to do with human affairs, and a large number of tablets contain observations and forecasts for the use of astrologers; but the complete system of astrology which passed from Babylonia to Greece was probably a creation of the Chaldæans in the beginning of the second millennium B.C. In medicine a false diagnosis, ascribing the origin of disease to the influence of demons, retarded progress, but much advance was made in surgery, operations on the eye and other organs being mentioned already in the time of Hammurapi. How much was due to the Sumerians, and how much to the Semites, in these various branches of learning, is as yet impossible to determine.

The Sumerians, no doubt, invented the system of writing (see CUNEIFORM INSCRIPTIONS). Only a small part of the inscriptions can be classified as literature in the strictest sense. There are thousands of contracts, magical texts, letters, and dispatches; but there are also many poems, stories, historical inscriptions, and scientific tablets. In Babylonian poetry each verse is divided by a definite number of stressed syllables or beats, and the verses are written in separate lines. Most of the poems are of a religious nature. The stories are well told. There are also commentaries on earlier works, syllabaries, and grammatical paradigms for the use of learners. Many inscriptions are bilingual, in Sumerian and Akkadian.

**Religion.** The chief gods of the Sumerian pantheon were Anu, the heaven god, of the city of Anu, later at Durilu; Ellil, the god of Nippur; Ea or Ae, the sea god, of Eridu; Ningirsu of Lagash; Shuruppak of Shurrupak; Marduk of Eridu, later of Babylon, the son of Ea; Babbar or Utu, the sun god, of Larsa; Nannar, or Enzu, the moon god of Ur; Tammuz, the brother of Marduk, and lover of Nanai of Uruk; Nergal, the war god, of Kutha; and Zamama of Kish. Among the goddesses mention may be made of Bau and Ninharsag at Lagash; Ninlil at Nippur; Nanai at Uruk; Ereshkigal, the goddess of the nether world; Gatumdag, Ningal, and Ninmach. In remote antiquity Anshar and Kishar, gods of heaven and earth, Lahmu and Lahamu (worshiped at Tell Lahm) seem to have played an important rôle. Some of these gods were adopted by the Akkadians, or identified with gods they worshiped. Shamash of Sippara; Nabu of Borsippa; Sin, identified with Nannar of Ur; Ishtar, identified with Nanai; Ninib, of unknown origin, and his spouse Gula; Anunit of Accad are among these. The Amorites brought in new gods, such as Hadad, Amuru, Dagan, and the goddess Ashirta. Numerous myths were told concerning these divinities and the many semi-divine heroes, such as the stories of the creation of the world through Marduk after his victory over the Chaos-monster Tiamat; of Adapa, or Adama, who just missed immortality by following too closely Ea's advice; of the ten antediluvian

kings; of the deluge from which Utnapishtim of Shuruppak is saved, so similar in its details to the story in Genesis; of Zu, the storm god, who stole from Ellil the tablets of destiny; of Etana, who, seated upon an eagle, ascends to heaven, but is overcome by fear and falls to earth; of Nergal's violent entrance into the lower world and his marriage to Ereshkigal, through which he becomes ruler of the realm; of Ishtar's descent to hell and escape from there; of Gilgamesh, the hero of Uruk, his friend Eabani, their attempt to rescue Nanai from Elam, and the journey of Gilgamesh to paradise, where he hears from Utnapishtim the story of the flood. It is becoming increasingly evident that the Sumerians developed most of this mythical material. Some of the stories deal with the nether world, whither gods may go, and men must. Gods may be sprinkled with the water of life and returned from the realm below, but there is no intimation that men may. A hero like Utnapishtim is regarded as having been translated to a realm of the blest, apparently in the Persian Gulf, and a king like Gilgamesh may go there and return. For ordinary mortals, certainly, there was no hope of anything but the most shadowy existence beyond the grave, involving neither rewards nor punishments. It was important, however, that the dead should be properly buried; otherwise they might appear as ghosts to harass the surviving kinsmen.

There were various classes of priests, soothsayers, diviners, conjurers, exorcists, omen readers, seeking for signs in the entrails of animals, especially in the liver; astrologers, offerers of sacrifices, singers, and temple attendants. Liturgical formulas, prayers, and hymns have come down to us, revealing the intensity and warmth of the religious feeling. Great festivals were held, such as the New Year's Feast, when Marduk was carried in procession to the zagmuk sanctuary and back to his temple, and Nabu came from Borsippa to visit his shrine in the temple of Marduk, and the Tammuz and Ishtar festivals. On the 7th, 14th, 21st, 28th, and also the 19th day of the month sacrifices were offered to give rest to the hearts of the gods and business was generally suspended. Among the hymns that have been found are many that were used on New Year's Day; others that were sung in honor of Shamash, Sin, and Ishtar, and some that were chanted as lamentations over Tammuz and as odes of rejoicing over his return to life.

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**BAB'YLO'NIAN ART.** The style of art current in the valley of the Tigris and Euphrates, from the beginning of historic civilization until the time of the Median Conquest, in about 500 B.C., during a period of 4000 years or more. Its interest is increasing from the fact that it appears to represent the earliest artistic effort of mankind in many branches, antedating the culture of Egypt by a considerable period. The Babylonian temperament was, like the Egyptian, traditional, and the changes in style were few and conditioned largely by degrees of mastery over technical processes—over materials and implements. It was essentially a religious, priestly art, and its monuments can hardly be appreciated without a knowledge of Babylonian literature, mythology, manners, and customs. So far as can be judged from the very insufficient excavations, the periods of artistic de-

velopment were: 1. The pre-Sargonic era of primitive art, crude, especially in its sculpture, and with imperfect technical attainments. It extends to 3800 B.C. 2. The Age of Sargon, the golden era, distinguished for broad style with exquisite finish and perfection of technique. It lasted from 3800 to 2800 B.C. 3. After the interval of Elamite invasion came the Age of Khammurabic (Hammurabi) (2200–1700 B.C.), the silver era, when Babylon was the centre of Mesopotamian civilization, when art was somewhat more stereotyped and careless. 4. The Kassite Age (from c.1700 to c.1000 B.C.) with gradual complete decadence under a semi-barbarous dynasty, with loss of all reality and life, and final subservience to Assyrian art. 5. The Renaissance, under Nebuchadnezzar, when the ancient style of the best age, that of Sargon, was reproduced as closely as possible (c.600 to 500 B.C.). The researches and excavations that have disclosed what we know of Babylonian art are detailed under BABYLONIA. The Louvre is the only museum in Europe that contains many of the larger works; other collections being confined to terra cottas and carved boundary stones (British Museum, Berlin, etc.), and to engraved stones (Louvre, Bibliothèque Nationale, Paris; British Museum; Le Clercq collection; Metropolitan Museum, New York; etc.). The Museum of Constantinople is beginning, however, to receive a number from the latest excavations of Tel-lo, Babylon, Nippur, etc. The characteristic forms of Babylonian art are its brick architecture, with heavy masses of masonry and small vaulted interiors, with its lack of columns or piers or carved details, and its use of color surface decoration of faïence, fresco, and hangings; its development of the industrial arts, especially of bronze casting, terra-cotta figurines, and reliefs and glyptics, or the cutting of hard and precious stones. Hitherto it is from these small objects, many thousands of which have been found, more than from the few pieces of large statuary and reliefs, that the character and continuity of Babylonian sculpture can be judged. (See GLYPTIC.) The artistic influence of Babylonia was widespread and strong. It is tolerably certain to have been exercised in the formation of Egyptian and Elamite art at a very early date. The comparison of the brick making of the temple pyramids and the statuary of the two countries are among the indications for Egypt. The few researches for pre-Median Elam prove the same thing for sculpture, but excavations have not yet gone deep enough to show what was the primitive Elamite architecture. Then, the Babylonian conquests on the Mediterranean carried Babylonian art to Syria, even to the island of Cyprus, and into Asia Minor among the Hittites. The Phœnicians not only copied it, but carried it westward. Considering that Assyrian art also was substantially a branch of Babylonian, it is clear that Babylonian art was not only supreme throughout western Asia, but bore directly upon North Africa and the Pelasgians and other Ægean peoples and therefore upon early Greek art. Its influence survived it in Persia, and, through it, in the later Oriental art of Parthians and Mohammedans. Even China and India felt it.

**Architecture.** Architecture as a fine art was first practiced in the valley of the Tigris and Euphrates, in the region we call Babylonia. Here were worked out the earliest forms of religious and civil structures. Everything had to be invented—materials, tools, methods, architectural forms, from the merest details to the broadest compositions. It was the same with the other arts utilized to assist in this development of architecture. The material used was brick, sun-dried and kiln-baked. The obvious reason for this was the absence both of stone quarries and of forests for timber. The tools required were therefore extremely simple; and the forms of ornamentation and composition were conditioned both by the material used and the physical surroundings. The absence of stone for walls and columns and of wood for timbers forced the builders to make their walls thick and their halls narrow, so that they could be spanned by brick vaulting. Thus, at the very beginning the arch and vault were invented—both the false corbel arch with straight courses and the true voussoir arch. Both pointed and round arches were used in barrel vaults. Since the country was very flat, it was difficult to lend impressiveness to buildings. In almost every other country natural eminences could be found, but here artificial platforms had to be constructed to make the buildings bulk large in the landscape. On this immense stage arose solid artificial mounds supporting single buildings or groups. The principal mound was always that of the temple, which was in the shape of an immense stepped truncated pyramid. At Babylon the "Birs Nimrud" is reckoned to have been over 250 feet high. The tower varied in the number of its stories from three to seven. The ascent was made in various ways—either by a continuous inclined ramp around the receding stories, or by a combination of internal staircases through the mass. On the way up were shrines, and the summit was crowned by the principal sanctuary. The chambers, however, were few and small. The stories appear to have been colored differently. In many temples the builders used brick dipped in colored enamel, to signify that each particular story was consecrated to one of the planetary deities. These brick were stuck into the mass of sun-dried brick, and formed both a preservative and a decoration. Moldings were used as well as color. The broad surfaces were broken into panels, often framed by pilasters or groups of palm-stem shafts, and even by series of convex flutings. The sites of nearly all the great Babylonian cities have been located, but natural disintegration has reduced them all to masses so unpromising and shapeless, without traces of construction, as to have discouraged explorers. Now, however, the buildings of Sirpurla, Nippur, and Babylon itself are being brought to light, and something has been done at Lippara, Eridu, Larsa, Ur, and Erech. At Tel-lo (= Sirpurla) the French have unearthed a royal palace dating back to about 5000 B.C., but rebuilt by King Gudêa. Its platform was 12 meters high, 200 meters long, and 50 meters wide, and was reached both by a stairway and by a ramp. The palace itself is an elliptical rhomboid, almost like a barrel. The outer walls are decorated with pilasters and semi-columns. The rooms, 36 in all, are grouped around three courts, presumably, as in the later Assyrian palaces, the centres of the three sections—state apartments, harem, and dependents' quarters. The decoration given to these apartments is unknown. In other sites brilliantly enameled

cones were stuck into the soft bricks to form varied patterns. Far larger and more sumptuous palaces existed in other Babylonian cities, but they have not yet been excavated. Compared with our rapidly growing knowledge of the history, religion, and literature of the Babylonians, our knowledge of their architecture is small. No history of this architecture can yet be written. It would appear as if the reconstructions by the Neo-Babylonian kings, such as Nebuchadnezzar, of the ancient sacred shrines, such as the temples of Babylon and Ur, were substantially in the same style as the original structures built 2000 or 3000 years before. See BABYLON; BABEL, TOWER OF; NIPPUR.

**Sculpture and Minor Arts.** The use of sculpture in relief and in the round appears contemporary with the earliest architecture. The only group of works in historic sequence yet found is that from the mounds of Tel-lo. Many of these sculptures are carved with historic and dedicatory inscriptions of the rulers which make their date indisputable. There are very crude reliefs of the period c.4500–4000, including the famous battle and funeral scenes of the "Stele of the Vultures"; there are reliefs more delicate in technique and advanced in form, belonging to the age of Sargon and Naramsin (3800–3700); then a series of colossal statues in very hard stone of the time of King Gudêa, a little later, resembling in technique the statues of the ancient Empire of Egypt, though clumsier in proportion than these. Statues, both standing and seated, steles, friezes, carved basins, and other classes of reliefs show that the Babylonians practiced sculpture in more varied form than their successors, the Assyrians; but so far as can be judged by the monuments yet discovered, they never attained the skill of the Assyrians in low relief. There was a greater use of religious and mythological scenes, but the annals of the kings also supplied frequent themes. Of their ability to render genre scenes and animal life, in which the Assyrians were later successful, we can judge only from a few examples, such as some later terra cottas of animals and the seal cylinders. The treatment here is realistic and with good treatment of surfaces, without the sharpness of line and energy of Assyrian work. It is only from the minute sculpture of the cut gems and stones of the cylinders and seals that some idea of the historic development of Babylonian sculpture can be obtained during its course of over 4000 years. Every Babylonian was supposed to wear his seal and use it as his signature on all occasions, impressing it on the soft clay used as the universal writing material. The variety of the scenes carved upon them is wonderful, no two being exactly alike. Large collections of these small works have been made in Europe and America. The largest are those of the Louvre, the Bibliothèque Nationale, in Paris; of M. Le Clercq, also in France; of the British Museum; and of the Metropolitan Museum, New York. Several thousand can now be studied, and they illustrate the mythology, theology, religious rites, manners, and customs of the country better than any other works that have been found. Some are of extremely primitive workmanship, often executed principally with the drill, round holes of various sizes representing heads, shoulders, elbows, hands, hips, knees, and feet, connected often by lines. Others, especially those between the time of Sargon (3800) and Ur-gur (2700), are wonderful in their technique, soft textures, and perfect rendering of detail. Such subjects as the adventures of Gilgamesh—the Babylonian Hercules—the fight of Merodach and the Dragon, or Order and Chaos, and the adoration scene of some patron god, are the most frequent.

Other branches of sculpture are less well represented by discoveries, but sufficiently to prove considerable proficiency on the part of the artists. Precious metals were embossed and chased, as shown in the famous silver cup of Tel-lo, now in Constantinople. Bronze figurines were cast at an early date with considerable skill, many being yielded by the Tel-lo excavations. Terra-cotta sculptures were made from molds in relief and in the round, and afterward finished by hand. A very original form of such work was the building up of large figures in relief, or the round out of separate tiles molded and then enameled in brilliant colors. Recent excavations at Babylon have brought to light an entire royal avenue leading through the city, flanked by colossal lions of this technique. The palace of Sargon at Khorsabad, and the palace at Susa, show that the Assyrians and Persians imitated this branch of art. See BABYLONIA.

The best restorations and descriptions are "La Chaldée et l'Assyrie," vol. ii of Perrot and Chipiez, *Histoire de l'art dans l'antiquité* (Paris, 1884), trans. by Armstrong, *History of Art in Chaldea and Assyria* (London, 1884). A good brief account is given in Babelon, *Manuel d'archéologie orientale* (Paris, 1888), trans. by Voetts, *Manual of Oriental Antiquities* (New York, 1889). The Tel-lo-Sirpurla discoveries are described briefly in Henzey, *Un palais Chaldéen* (Paris, 1884), and fully in De Larzec and Henzey, *Découvertes en Chaldée* (Paris, in course). The best historic and scientific treatment of gems is in Menant, *Les pierres gravées de la Chaldée et de l'Assyrie* (Paris, 1884), and the best series of illustrations and detailed descriptions in Menant, *La collection Le Clercq* (Paris, 1888). For explorations, consult Loftus, *Travels and Researches in Chaldæa and Susiana* (London, 1853), and Peters, *Nippur*, (New York, 1897). Compare also A. H. Layard, *Discoveries in the Ruins of Nineveh and Babylon* (New York, 1853); H. V. Hilprecht, *The Babylonian Expedition of the University of Pennsylvania* (Philadelphia, 1893); id., *Explorations in Bible Lands During the Nineteenth Century* (Philadelphia, 1903).

**BABYLONIAN EXILE.** The name given to the deportation of Jews to Babylonia by Nebuchadnezzar (604–562 B.C.) and to the period extending from the destruction of Jerusalem in 586 to the first year of Cyrus (538), when permission was granted to them to return to Palestine. The policy of deporting the principal inhabitants of conquered districts, as an effective means of preventing insurrections, was followed by the Assyrian monarchs. Thus Tiglath-pileser IV in 733 carried away parts of the population of Galilee and the country east of the Jordan; and after the capture of Samaria by Shalmaneser V, his successor, Sargon II, in 721 took many captives to Assyria and settled them in Mesopotamia and Media. The kings of the Chaldæan period adopted the same policy, and Nebuchadnezzar carried away Jehoiachin, the

royal household, the princes, and 10,000 men to Babylonia in 597; when Jerusalem was destroyed in 586, a second deportation took place (2 Kings xxv.), and in 581 a third. According to the account in Jer. lii. 28–30, 3023 Jews were carried away in 597; 832 persons from Jerusalem in 586; and 745 Jews in 581. It is evident that the vast majority of the inhabitants remained in the land, even when account is taken of those who went into a voluntary exile in Egypt. Those who were taken to Babylonia were settled in various parts of the country. From the Book of Ezekiel we know that those who were exiled in 597 lived on the river Chebar. This, in all probability, is the canal *Kubaru* mentioned in inscriptions found at Nippur (see Hilprecht and Clay, *Business Documents of Murashu Sons* (Philadelphia, 1898)). Traces of settlements of Jews in Babylonia may be seen in the numerous Jewish names that appear in the so-called contract tablets belonging to the Chaldæan and Persian periods. From these and other sources it is clear that many of the Jews acquired riches in Babylonia, and that, on the whole, they all lived in ease and comfort, if not in prosperity. As all other foreigners, they were allowed the greatest possible freedom and soon adopted the customs of the country. Instead, however, of cultivating the soil, as they had done in their own country, they entered upon commercial life; and this change from agricultural pursuits is perhaps the most significant feature of the Babylonian exile, which profoundly influenced the future fortunes of the Jews. So complete was the assimilation to Babylonian ways of life that when, after the capture of Babylon by Cyrus in 539 B.C., permission was given to the Jews to return to Palestine, only a comparatively small number availed themselves of the opportunity. Some priests and pious Yahwe-worshipers were impelled to take up the pilgrim's staff and to seek for new homes in Jerusalem or other parts of Judæa, now ruled by Sheshbazzar as Persian governor; but their experiences do not seem to have encouraged others to emigrate from Babylonia. Conditions were apparently more favorable there than in Palestine. Hence the response to Ezra's appeal in the time of Artaxerxes I was no more hearty than to that of the so-called Deutero-Isaiah in the days of Cyrus.

The period of the exile was an important epoch in the religious life of the people, both in Babylonia and in Judæa. It was natural that the downfall of Jerusalem should be looked upon as a punishment sent by Yahwe for the sins of the people in not following the injunctions of the law and the teachings of the prophets. Especially was the cause of the prophets strengthened by the catastrophe. It could not be forgotten that they had foretold this doom upon the nation. The event proved them to be true prognosticators of the future. Yet they had been exposed to evil treatment. Their oracles were gathered together, and words of comfort were now added. We owe to this tardy recognition the precious remains of pre-exilic prophecy in Israel and Judah. The new spirit manifested itself also in the collection of the annals and stories of the past and their arrangement and presentation in such a manner as to emphasize what seemed the obvious lesson taught by the prophets, that there was no god like Yahwe, who knew how to reward his people for faithful service, but also how to punish them for disobedience to his will. It was important, therefore, for the future to know exactly what was the will of Yahwe. This gave a strong impulse to the collection of laws and the working out of codes regulating the forms of worship and the conduct of life. Soon after the fall of Jerusalem Ezekiel seems to have felt the necessity of elaborating such a code, based upon, and yet deviating from, the earlier codes. (For the relation of this code to the Mosaic legislation, see PENTATEUCH.) Of fundamental importance for later Judaism were also the ideas of Yahwe as the only existing god, the creation of the world, the election of Israel for service, and the infallible revelation of the future, set forth by the prophet whose words have come down to us in an appendix to the Book of Isaiah (chap. xl.–lv.) and who is supposed by most scholars to have uttered his oracles c.540 B.C., as his references to Cyrus by name and the unrealized hopes centred on this King seem to indicate. (See ISAIAH.) What part of the literature of the time came from exiles in Babylonia and what part originated among the people left in Palestine cannot easily be determined. Some of the earlier elegies in the Book of Lamentations have the appearance of coming from the latter source; and the same is true of the collections of history and ancient law made at this time. Whether the Babylonian Jews built for themselves a temple, as the Egyptian Jews did at Yeb (see ELEPHANTINE PAPYRI), we do not know; but it is by no means improbable, and the religious condition of the exiles in Babylonia is not likely to have been essentially different from that of the exiles in Egypt.

The Babylonian exile is generally regarded as coming to an end in 538 B.C.; and the following period is spoken of as "post-exilic." While there is no reference to an exile of 48 years (586–538) or 59 years (597–538), a 70-year period is often mentioned, probably counted from 586 to 516, when Zerubbabel's temple was dedicated. The completion of this temple, however, did not bring about any return of Jews to Palestine. At some time in the reign of Artaxerxes I (465–425 B.C.) 1496 persons left Babylonia for Palestine with Ezra, according to Ezra viii. 1–14. The bulk of the exiles never returned, but formed a part of what was called the *golah*, or *diaspora*, the body of Jews, voluntarily or involuntarily living away from Palestine, dispersed among the nations.

The name "Babylonish Captivity" is frequently applied in the history of the Church to the residence of the Popes at Avignon, from 1309 to 1376. See PAPACY.

**Bibliography.** For the history, consult Stade, *Geschichte des Volkes Israel* (Berlin, 1888, vol. ii, pp. 1 ff.); Piepenbring, *Histoire du peuple d'Israel* (Paris, 1898); Kent, *A History of the Jewish People* (New York, 1899); Guthe, *Geschichte des Volkes Israel* (2d ed., Leipzig, 1904); Benzinger, *Geschichte Israels bis auf die griechische Zeit* (2d ed., Leipzig, 1908); also for the special problems connected with the return from the exile, Kosters, *Het Herstel van Israël in het Perzische Tijdvak* (Leyden, 1893); Hoonacker, *Nouvelles études sur la restauration juive* (Louvain, 1896); Cheyne, *Jewish Religious Life after the Exile* (New York, 1898); Meyer, *Entstehung des Judentums* (Halle, 1896); Torrey, *Ezra-Studies* (Chicago, 1910).

**BACACAY,** bä-kä-kī′. A town of the Philippines, in Albay, on the island of Luzon. It is situated on the south shore of Tabaco Bay, about 11 miles north of Albay, the capital, and grows much hemp. Pop., 1903, 14,214.

**BACALAO,** bä′kä-lä′ō. 1. A name applied in the West Indies to a grouper (*Mycteroperca falcata*), also called scamp and abadejo, and common in the markets. (See GROUPER.) 2. Formerly this word was applied in Europe to weather-cured codfish. "Among the Greeks the large codfish were called bacchi, from bacchus, a rod . . . by the Iberians the dried cod were called bacalaos from baculeum, a small stick. The rod held by Mercury was called a baculeum" (Brevoort, quoted in Goode's *Fishery Industries*, sec. 1, p. 200, Washington, 1884). The term is used in all the accounts of the early fishing expeditions from Europe to the Banks of Newfoundland and has long survived. A letter from Madrid to *The Remembrancer* (London, 1776), recounting discoveries on the coast of California, mentions the taking there of "cod, known in Spain by the name of *bacallao*."

**BACARRA,** bä-kär′rä. A town of Luzon, Philippines, in the province of Ilocos Norte. It is situated on the right bank of the Grande de Bacarra River, 4 miles north of Laoag, and had a population in 1903 of 14,616 (Map: Philippine Islands, C 1).

**BACAU.** See BAKAU.

**BACCAHIRY.** See BAKAIRI.

**BAC'CANARISTS.** See PACCANARISTS.

**BACCARAT,** bä′kä′rä′. The chief town of a canton, arrondissement of Lunéville, in the department of Meurthe et Moselle, France, on the river Meurthe, 15½ miles southeast of Lunéville by rail (Map: France, N., M 4). It is noted for its extensive plate-glass and crystal factories, an industry established in 1765. Pop., 1901, 6085; 1906, 6996; 1911, 7277.

**BACCARAT,** bä′kä′rä′ (Fr. of unknown origin). A game of cards, said to be of Italian origin and to have been introduced in France in the time of Charles VIII. The game is played for money between one of the players, who is called the banker, and any number of others. Each of the face or court cards, in all countries except America (where the face cards and tens have no value, and the naturals are 8 and 9), counts 10; in others, according to the number of their spots. Bets having been made, two cards are dealt by the banker to each player, including the banker himself, and if more than one pack of cards is necessary to deal round to all the players, more are used. Each player's aim is to make the value of his cards foot up the total of 9, 19, 29, or as near these totals as is possible. Any player has the privilege of *standing*, or remaining *content* with the two cards dealt to him at the outset by the banker, or he may call for more. When any player has a *natural*—i.e., a sum making 9, 19, or 29—he declares that it wins, and the banker has to pay all who hold hands of higher value than his own, receiving payment from all whose hands are inferior. The principal advantage in the game lies with the office of banker, which in social games is usually determined by cutting the cards. The banker retains his office until defeated by all the players in the same hand, in which event he surrenders the bank to the player winning on the highest hand. Consult Billiard, *Bréviaire du baccara experimental* (Paris, 1883).

**BACCELLI,** bät-chĕ′lē, GUIDO (1832–1916). An Italian physician and statesman, born at Rome. He studied medicine at the University of Rome, where he later successively filled the chairs of medical jurisprudence, pathological anatomy, and clinical medicine. In 1874 he was elected a member of the Chamber of Deputies and in 1880 was made Minister of Public Instruction. In the latter capacity he projected a thorough reorganization of higher instruction in Italy; but his plans met with decided opposition, in consequence of which he resigned his portfolio in 1884. In 1890 he was made a Senator, and subsequently, from 1893 to 1896 and from 1898 to 1900, again acted as Minister of Public Instruction. In 1901–03 he served as Minister of Agriculture in the Zanardelli cabinet. He became director of the medical clinic in Rome. His published writings include *Patologia del cuore e dell' aorta* (new ed., 4 vols., 1883–87).

**BACCHÆ,** bäk′kē. 1. A name given to the women companions of Bacchus in his journeys through the East, and to the female participants of the Dionysian festivals. They were crowned with wreaths of vine leaves, wore fawn skins, and carried the thyrsus. 2. A brilliant play of Euripides, abounding in tragic situations and splendid spectacles. See BACCHUS.

**BACCHANALIA,** bäk′kä-nā′lĭ-ä. See BACCHUS.

**BACCHANTES,** bäk-kăn′tēz (Lat. nom. pl. pres. p. of *bacchari*, to celebrate the festival of Bacchus). Devotees of Dionysus (Bacchus), both men and women, who engaged in orgiastic worship of the god. See BACCHUS.

**BACCHIDES,** bäk′kĭ-dēz. One of the comedies of Plautus, presented in 189 B.C. The early scenes are missing, having disappeared about the fifth century A.D. It is one of the best of Plautus's plays, especially in the skillful working up of the intrigue. It gets its name from the two sisters whose fortunes it portrays.

**BACCHIGLIONE,** bäk′kē-lyō′nē. A river of northeastern Italy, rising in the Alps. It flows eastward, traversing Vicenza and Padua, and after a course of 70 miles enters the Gulf of Venice. It is canalized as far as the city of Padua, whence a canal connects it with the town of Este and the river Adige.

**BACCHUS,** bäk′kŭs (Gk. Βάκχος, *Bakchos*). Also called Dionysus (Gk. Διόνυσος, *Dionysos*) by the Greeks; this name perhaps meant 'Son of Zeus.' A god who originally belonged to the great group of vegetation spirits, whose worship was widely spread among European nations. As such his coming in the early part of the year was received with joy and revelry, while his departure or death was also celebrated at the winter season. In some instances of this sort of worship the old spirit is regarded as dying that the new one may be born, and there is some reason for believing that this feature was also found in the rites of Dionysus. The god never lost his early connection with the flourishing of vegetation and with fruitfulness generally, but he came to be associated more and more closely with the vine and its inspiring produce. His worship was exceedingly widespread and appears in manifold local forms and with large admixtures of foreign elements. Indeed, some of the myths seem to indicate the presence of a god of light as well as a true chthonic deity. There is also much in the worship and legends that indicates a foreign origin for the cult, though there can be no doubt that

many features, such as the satyrs, are purely Greek. So widely different are the stories and so varied the myths in which the god appears, that only some of the more important can be indicated. The common legend of his birth seems to have been that of Thebes. Zeus loved Semele, the daughter of Cadmus; but the jealous Hera induced her rival to beg the god to appear to her in all his splendor. Naturally the mortal was consumed by the thunderbolt; but Zeus saved her unborn child and sewed it in his thigh, whence in due time it was born. In this legend some have seen in Zeus the fertilizing rain-god and in Semele a personification of the earth. The infant was intrusted to Hermes, who delivered him to the nymphs of Nysa. This Nysa cannot be localized; wherever the worship of Dionysus was established, there story set a Nysa, sacred to the god. At Nysa, then, the god discovered and taught the powers of the grape and headed a band of nymphs and satyrs, the so-called Thiasos, with whom he wandered over the earth, communicating his new gift to men, blessing those who received him gladly and punishing his enemies. For the legends have much to tell of opposition to the new worship. So Lycurgus, King of Thrace, drove Dionysus in terror to the depths of the sea, but later perished miserably because of his opposition to the god. The story of Pentheus, King of Thebes, who cast Dionysus into prison, but was himself later torn in pieces by his own mother, Agave, and the Theban women who had been driven by frenzy to celebrate the rites of the god, forms the subject of the *Bacchæ* of Euripides. There is much to indicate that in these stories we have really versions of the death and the return of Dionysus himself. In friendship, on the other hand, Dionysus visits Icarius at Icaria, in Attica; but even here the story ends in death, since Icarius is killed by peasants, who fancy themselves poisoned by his new gift of wine. Another instance of Dionysus' power is furnished by the story of the transformation into dolphins of the Tyrrhenian pirates, who bound him in order to carry him to Italy. It is told in a Homeric hymn and also in the marble reliefs which decorate the choragic monument of Lysicrates in Athens. He took part also in the battle of the gods and the giants. Legend also makes him wed Ariadne when she was abandoned by Theseus on the island of Naxos. The conquering tour of Dionysus was greatly extended under the influence of Alexander's conquests; and the god's subjection of the East and India became a subject of later poets, and is preserved to us in the epic of Nonnus. He even descended to the underworld and brought back to earth his mother Semele. Thenceforth she was worshiped as Thyone, and Bacchus himself as Thyoneus. Bacchus had prophetic power too; his oracle at Delphi was of prime importance.

In art two types prevail. In the earlier period the god is represented as bearded and fully draped, and this type was not unknown in later times, when it was sometimes called "the Indian Bacchus." From the middle of the fourth century B.C. another type steadily gains in popularity, representing the god as a beardless youth, markedly effeminate in appearance, nude or wearing only the fawn skin, or *nebris*. He appears also as an infant, as in the famous statue of Hermes by Praxiteles. The chief attributes of the god are the thyrsus, or rod ending in a pine cone and wreathed with ivy, and the great two-handled drinking cup (the cantharus). He is often accompanied by a panther, and the bull and the goat were closely associated with his worship. He is sometimes represented with the horn of a bull on his forehead. Naturally, as a god of vegetation and the vine, Dionysus was associated with Demeter. Ceres, and the Eleusinian Mysteries, where he bore the name Iacchus. In the mystic worship which grew up in the sixth century B.C., under the name of Orpheus, Dionysus Zagreus played a prominent part, and no doubt Orphic influence helped to produce the confusion of elements which is so marked in all this cult.

In the worship of Dionysus two distinct forms may be traced. The one appears most clearly in the Attic festivals, especially the country Dionysia. It is essentially a joyous but rude and boisterous vintage festival, celebrated by men and abounding in mummeries and coarse jests. Its connection with vegetation and fruitfulness is shown by the phallic procession, which held a prominent place in the celebration. The connection of Dionysus with wine occurs first in Hesiod. (For an account of the Attic Dionysia, see GREEK FESTIVALS.) The other form of Dionysiac worship was highly orgiastic, and was celebrated by women, at the time of the winter solstice, in alternate years; hence it was called the Triateric Dionysia. The celebrants, called in Greek Mainades, or Mænads, wandered among the mountains, indifferent to the cold, wearing fawn skins and carrying the thyrsus and torches, for the chief rites were held at night. The god was said to be lost, and was sought with wild cries. The culmination of the orgy was in tearing in pieces fawns, kids, and other animals and devouring the raw flesh in honor of the god. We hear even of human victims being rent asunder. These rites were thought to be an endeavor to arouse the dead or sleeping god; but it is also clear that originally the slain animal was the god, who was killed to be reborn. It is a common feature of primitive religions for the worshiper to partake of the god, especially if it be a deity connected with vegetation or fertility. Hints of these orgiastic rites appear in Homer. The rites were especially associated with Thebes and Delphi, though we hear that even Athenian women went to Mount Parnassus to join in this fierce and bloody worship. In later times the mysteries celebrated under the name of Dionysus became more and more occasions for intoxication and gross licentiousness.

The *Bacchanalia* were introduced into Rome early in the second century B.C., and at first were celebrated on three days of the year by women only. Later a priestess opened the mysteries to men, introduced evening celebrations, and greatly increased their frequency. The gatherings soon became suspected of gross immoralities; and in 186 B.C. the Senate ordered the consuls to arrest the priests and forbid further meetings of the association throughout Italy. The result of the judicial inquiry was that the majority of the members were sentenced to death, and others to life imprisonment, while by a decree of the Senate all such associations were forbidden in Italy. The decree (*Senatus Consultum de Bacchanalibus*) has been preserved in a single copy, *Corpus Inscriptionum Latinarum*, i, 196–x, 104.

On the vegetation spirits and their worship,

consult Mannhardt, *Wald und Feldkulte* (Berlin, 1875–77). On Dionysus, consult: Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i (Leipzig, 1884–90); Preller-Robert, *Griechische Mythologie*, vol. i (Berlin, 1894); B. I. Wheeler, *Dionysus and Immortality* (Boston, 1899); Frazer, *The Golden Bough*, vol. ii (1913); Farnell, *Cults of the Greek States*, vol. v (Oxford, 1910); O. Gruppe, *Griechische Mythologie und Religionsgeschichte*, vol. ii (1907).

**BACCHUS AND A'RIAD'NE.** A painting by Titian, founded on the Greek myth of the marriage of Dionysus to the wife of Theseus, after she had been deserted by the slayer of the Minotaur upon the island of Naxos. The picture hangs in the National Gallery, London. Set in a background of thicket and sedge and ocean, Ariadne is turning away, filled with maidenly confusion, as the leopard-drawn chariot, surrounded by satyrs and mænads, descends, bearing the god. Its date is 1523.

**BACCHYLIDES,** băk-kĭl'ĭ-dēz (Gk. Βακχυλίδης, *Bakchylidēs*) (c.507 B.C.—?). A Greek poet, born at Iulis, on Ceos, at the end of the sixth century B.C., who flourished between 470 and 460 B.C. He was a nephew and pupil of Simonides and the rival of Pindar, according to well-established tradition. He lived for a time at the court of Hiero I, tyrant of Syracuse, who greatly admired him and whom he celebrated in three of his poems. When exiled from his native town, presumably by political opponents, Bacchylides resided in the Peloponnesus, and records of many of his victories in dithyrambic contests at Athens have been preserved. Some of the poems show intimate knowledge of the Peloponnesus. As the youngest, he was placed last in the list of nine lyric poets deemed worthy of immortality by the canon of the Alexandrian critics, who admired his grace and sweetness. (See ALEXANDRIAN AGE.) Though admired by Horace, and much read till 400 A.D., he finally shared the fate of the canonized lyric poets, whose works, with the exception of Pindar's, were all lost to posterity. Until 1897 only 107 lines were preserved in quotations, the longest one of 12 verses only. In 1896, the British Museum acquired, in Egypt, 200 fragments of a papyrus of Bacchylides. Pieced together by F. G. Kenyon, they formed 1070 lines. Thus 6 poems were recovered practically entire, 8 others with lacunas, and 6 in considerable fragments. Fourteen are *Epinikia*, or Odes of Victory, of which 2 in honor of Hiero and 1 in honor of Pythias of Ægina duplicate odes of Pindar for the same occasions. The remaining 6 are the unique extant specimens of one department of Greek lyric poetry—dithyrambs. Pæans and hymns also occur. One poem (XVII) is the first recovered literary treatment of a subject common on vases—the descent of Theseus to the depths of the sea to prove his sonship to Poseidon. In style he is simple and clear, displaying a love of picturesque detail. Not so powerful, brilliant, or original as Pindar, he is a true and typical Greek poet in his smoothness, grace, and finish. His language has less of the Æolic admixture on the foundation of Doric than is the case with Pindar. The British Museum MS., in fine uncials, belongs to the first century B.C., and the accents and the breathings are generally carefully marked. The text was first edited by F. G. Kenyon (London, 1897), with an introduction and extensive notes. Another edition is by F. Blass (Leipzig, 1898). Consult: Wilamowitz-Moellendorf, *Bakchylides* (Berlin, 1898); Richard Jebb, *Bacchylides* (London, 1905); Angelo Taccone, "Della vita di Bacchilide" in *Bacchylides Epinici* (1907).

**BACCIO D'AGNOLO,** bät'chō dà-nyō'lō. See BAGLIONI.

**BACCIO DELLA PORTA,** dĕl'là pôr'tà. See BARTOLOMMEO, FRA.

**BACH,** bäĸ. The name of a family originating in Wechmar, near Gotha, Thuringia, famous in music and presenting the most remarkable instance of hereditary genius in all history. In seven generations there are found to be 49 musicians, 20 of whom, from Veit Bach (died 1619) down to Wilhelm Friedrich Ernst Bach (died, Berlin, 1845), have been more or less prominent musically, and one of them, Johann Sebastian Bach, is one of the great masters of music and the greatest of the Contrapuntal school. Veit Bach was a baker by trade, but devoted much of his spare time to zither playing. The best known of the early Bachs was Johann Christoph, son of Heinrich and a great-grandson of Veit. This Johann Christoph (1642–1703) was one of the important composers and organists of the seventeenth century, far surpassing his German contemporaries. None of his works were published, and many are lost; but his choral compositions (MSS. in the Berlin Royal Library) prove him the forerunner of Johann Sebastian and Handel.

**BACH,** ALEXANDER, BARON (1813–93). An Austrian statesman. He was born at Loosdorf, in Lower Austria, where his father held a judicial office. At the age of 24 he was made a doctor of laws, and then entered the Imperial service, where he remained for nine years. Although he favored a departure from the absolute system of Metternich, Bach was not prepared to go so far as the Revolutionists of 1848 wished. Popular opposition, in fact, drove him into the conservative ranks. In 1848, and again from 1849 to 1859, he was in the ministry, at first in the department of justice, and later in that of the interior. He stood for a strong and absolute central government, and opposed all measures that savored of liberalism and concession to other nationalities than the German. He however carried out some salutary measures, such as the emancipation of the peasants from their feudal obligations. From 1859 to 1867 he was Ambassador at Rome. Consult Springer, *Geschichte Oesterreichs seit dem Wiener Frieden* (Leipzig, 1863–65).

**BACH,** JOHANN CHRISTIAN (1735–82). Known as the English Bach. He was the youngest of the sons of Johann Sebastian. After his father's death his older brother, Karl Philipp Emanuel, continued his musical education and turned his interest in the direction of the lighter homophonic style, away from the severe contrapuntal style of the father. In 1754 he went to Italy as Kapellmeister of Count Litta. In Bologna he studied counterpoint with Padre Martini. He was appointed organist of the cathedral at Milan in 1760. All the time his reputation as a composer both of operas and sacred music was steadily growing. In 1762 he settled in London, where in the following year he scored a great success with his opera *Orione*, which procured him the appointment of music master to the Queen. As such he directed, jointly with K. F. Abel, the Bach-Abel Concerts from 1765 until his death. It was his misfortune to have been the son of his great

father, although his works belong to an entirely different school and ought to be judged accordingly. Johann Christian shows great talent, and his works are among the most important of their kind in introducing the reforms of Stamitz (q.v.). Even Mozart acknowledges his indebtedness to this son of Bach. Johann Christian was not only a meritorious but also a very prolific composer. He wrote 16 Italian and 4 French operas, 2 oratorios, an enormous number of instrumental works for many different combinations of instruments, and many pieces for the pianoforte, which instrument had come into great vogue in England since 1760. Consult M. Schwarz, *Johann Christian Bach* (Leipzig, 1900).

**BACH,** JOHANN SEBASTIAN (1685–1750). The greatest master of the Contrapuntal school of musical composition. He was born at Eisenach, March 31 (Old Style 21), 1685. He came of a Thuringian family, which presented a remarkable example of the principle of heredity. (See BACH.) Bach's father, Johann Ambrosius, was a violin player in the town band of Eisenach. His mother was Elizabeth Lämmerhirt, daughter of a furrier of Erfurt, where Johann Ambrosius had held a position previous to that at Eisenach. The boy was his father's pupil in violin playing until he was nearly 10 years old. After his father's death, in January, 1695 (two months after contracting a second marriage), he went to live with his elder brother, Johann Christoph, a pupil of Pachelbel and organist in the little town of Ohrdruf.

The Bachs held annual family and musical reunions. According to a description given by Bach's son, Karl Philipp Emanuel, to J. N. Forkel, one of Bach's biographers, these meetings opened with a chorale, which was followed by secular songs, until at a convenient pause some one of those present started a catch, in which each joined in proper turn with some humorous phrase, as likely as not hitting at a harmless family or individual failing; thus making a merry ending to the musical exercises of the reunion. The Bachs were a clan of working musicians; and quite as much as the violin lessons received from his father, the musical atmosphere of the Bach household and family traditions must have made their impression on Johann Sebastian. It was the homely life of people in humble circumstances, but it was permeated with music. To think in music was, from childhood, spontaneous—second nature with him. This, together with the scrupulous revision to which in his later years he subjected his earlier works, accounts for the sustained excellence of his vast production.

The Bach clan being so united, it is surprising that Bach's brother at Ohrdruf was moved more to jealousy than admiration by Sebastian's rapid progress. Johann Christoph taught him the clavichord, but kept from him a book containing works by Froberger, Buxtehude, Pachelbel, and others, which the boy coveted. Not to be thwarted, however, he copied the book stealthily and laboriously on moonlit nights, only to be deprived of his copy when it was discovered. The anecdote is wholly in keeping with Bach's devotion to his art. At school, besides his general education, he was trained with the other boys for the church choir and moreover sang at weddings and funerals. In April, 1700, Bach went to Lüneburg, where he was accepted at the school of St. Michael's for the choir of the church. His general education continued at the school; he took his commons at the refectory, and received musical training of much value for his future work, including high services with orchestra, choral singing, organ, and experience with a wider range of music. His fine treble voice, together with his knowledge of violin and clavichord, secured him immediate admittance to the advance matin choir. There was keen musical rivalry between the schools of St. Michael's and St. John's; and when in winter the choirs went through the town streets to sing, separate routes had to be marked out for each, to avoid quarrelsome meetings. As the organ became in time Bach's instrument par excellence, and as he is regarded as its greatest master in composition and as one of its greatest masters in playing, it is interesting to note that his serious study of it began in Lüneburg under George Boehm, a pupil of Reinken and a composer of distinction, who was organist at St. John's Church; which shows that while the musical rivalry between St. Michael's and St. John's was keen, it was also generous. The seriousness with which Bach went about the study of the organ is attested by the fact that he made several journeys to Hamburg to hear Reinken play and profit by his suggestions. Nearly 20 years later, when shortly before Reinken's death Bach played in St. Katherine's Church, Hamburg, an improvised elaboration of the chorale *By the Waters of Babylon*, the "father of North German organists" exclaimed: "I thought this art was dead, but now I see it lives on in you!"

Bach's eagerness to leave nothing undone that would aid his progress in his art was again shown a few years later, when he walked 150 miles from Arnstadt to Lübeck for a brief course of study with the famous organist Buxtehude. Bach had left Lüneburg in 1703, and for a few months was a member of the band of Prince Johann Ernest at Weimar. Chancing to visit Arnstadt, where his grand-uncle, Heinrich, had been organist, and where an organ lately had been installed in a new church, he played on the instrument. Although the trial is not believed to have been official, he was, at 18 years of age (August, 1703), engaged for a position similar to that which his grand-uncle had filled with honor. Bach went to Lübeck in 1705 and remained with Buxtehude three months, deliberately extending his month's leave from his Arnstadt duties for this purpose. Whatever the personal consequences might be, he was determined to derive the greatest possible artistic profit from his contact with the justly famous organist. The result was a great advance in organ technique, especially in new insight into the resources and use of the pedal, in which Buxtehude was a master. Naturally the authorities were displeased at this unceremonious extension of his leave from one month to three; although, with characteristically Bachian honesty of purpose, he pleaded as an excuse his desire "to perfect himself in certain matters touching his art." Further, however, he was rebuked "for that he hath heretofore made sundry perplexing variations and imported various strange harmonies, in such wise that the congregation was thereby confounded." He had returned to Arnstadt in February, 1706. In June, 1707, he accepted the position of organist of St. Blasius's Church at Mühlhausen with the same salary as at Arnstadt, and "the accustomed dues of corn, wood and fish." In October he married his cousin, Maria Barabara, whose

father, John Michael Bach, had been organist at Gehren. June, 1708, he resigned from Mühlhausen to become organist in the Ducal Chapel at Weimar. Conditions at Weimar were such as to quicken Bach's already active musical faculties. The life of the court was decorous, influenced by Duke William Ernest, a man of serious temperament, a patron of arts and letters and wisely active in bringing the music of the Ducal Chapel up to a high standard. He in fact laid the foundation of that culture which made Weimar the centre of German letters in Goethe's time, and gave it a "golden period" of music when Liszt resided there. In addition to his duties in the chapel, Bach played the violin or accompanied on the harpsichord in the Court Orchestra, wearing a Hungarian uniform, in which it is difficult at the present day to realize the appearance of the great master of the Contrapuntal school whose perruqued portrait has come down to us. Bach's growing fame as an organist brought him many invitations to try or inspect organs and to play at various courts. For playing a pedal solo on the organ at Cassel with an agility "which few could equal with their hands" he received from the Hereditary Prince a precious ring which the Prince drew from his own finger.

Bach remained at Weimar nine years. In 1717 he accepted from Prince Leopold of Anhalt-Köthen the office of kapellmeister at Köthen. The Prince, who sang bass and played violin, viola de gamba, and clavichord, warmly welcomed Bach into musical fellowship and made him his companion on various trips. It was the kapellmeister's duty to compose for the instruments on which the Prince played. Accordingly, as Bach's Weimar period is distinguished for his organ compositions, including several of his greatest works for that instrument; so to his Köthen period belong much of his chamber music and works for clavichord and for orchestra. In a general way, it may be characterized as a lighter period in his life—a temporary relaxation in his self-imposed, severe course of artistic development before entering, in 1723, on the final and greatest epoch of his career as cantor of the School of St. Thomas at Leipzig, when he achieved the logical results of a genius trained during 32 years of rigid preparation; a prelude which alone would have been a sure foundation for his fame, had he not later accomplished so much more in larger musical forms. It was during the Köthen period that Bach's first wife died. Of the 20 children born in his two marriages, the two who achieved greatest fame as musicians, Wilhelm Friedemann and Karl Philipp Emanuel, were of the first. His second wife, Anna Magdelena Wülken, whom he married in December, 1721, was a singer at the Köthen Court, and proved herself, both in his domestic and musical life, a helpmeet in the truest sense of the word. Bach's first marriage is known to have been happy, but artistic unions as mutually helpful and felicitous as his second are among the rarities of history.

The post of cantor (or choir master) of the School of St. Thomas in Leipzig was made, through Bach's incumbency of it, one of the most famous in music. The school, which was five centuries old when, in 1723, Bach entered upon his duties, included a choir and a grammar school; and the cantor was supposed to teach in both. Bach, however, assumed the latter duties only when the substitute whom he was allowed to engage was unable to act. Besides teaching the pupils vocal and instrumental music, the cantor had supervision not only of the music in the churches of St. Thomas and St. Nicholas, and in less degree in those of St. Matthew, St. Peter, and St. John, but also of the organists and other musicians of the municipality. He was, in fact, Musical Director of Leipzig. But the actual dignity was not so great as this enumeration of his duties would imply. During nearly his whole incumbency of the post this past master of his art was harassed by the Town Council, to which he was responsible and which sought to undermine his authority.

The result was that Bach found his usefulness as a teacher continually hampered. The Council even went so far as to accuse him of being slack; and this shortly after he had produced one of his greatest works, *The Passion according to St. Matthew*. On another occasion, when he had nine vacancies to fill among the choristers of his school, from which he supplied the various choirs under his supervision, the Council rejected four of those whom he had examined and nominated, and appointed others whom he had rejected. He was assigned a residence in the left wing of the Thomas building and received also the sum of 700 thalers annually. But the Council claimed that he was so unproficient an instructor in music that he must take part in the teaching of the school; and though he avoided this, the Council suspended some of the perquisites of his post. Those who are unfamiliar with Bach's life, or who form an opinion of the Leipzig cantorship from the fame that has come to it through Bach, are apt to imagine that for 37 years he occupied an exalted and congenial position, active as teacher and composer. In point of fact, neither Council nor city appreciated the genius they had within their walls, and not only wholly failed to honor Bach, but even thwarted him in his work. The position of this great man, who was so wholly devoted to his art that the attitude of the Council simply seemed to him "peculiar," and puzzled while it irritated him, was, if not downright pitiable, at least deserving of deep sympathy.

There was a brief respite for him of four years during which Johann Matthias Gesner, who seems to have appreciated the genius of the cantor, was rector of the school. In 1729 Bach was made conductor of the Musical Society—a position which he held until 1736, and his connection with which doubtless accounts for the composition of his secular cantatas. In one of these, *The Contest of Phœbus and Pan*, he took occasion to change the wording of the libretto so as to convey covert satirical allusions to the hostile rector who had succeeded Gesner, and to one Scheibe, a mediocre musician, whose application for a position as organist Bach had rejected, and who, in consequence, showed his ill will in every way possible. When the quarrels which so harassed Bach are analyzed, it appears that the School of St. Thomas suffered from the double government of rector and cantor—the one in matters of general education, the other in music; and that in asserting what he deemed his prerogatives the rector probably went to work more practically than the musician whom his art so deeply engrossed. Moreover, Ernesti, who succeeded Gesner, was a son of the Ernesti who was rector at the time Bach became cantor, so that in a measure he had inherited the

quarrel. How little influence Bach had in the musical life of Leipzig is shown by the fact that while the Society of Musical Sciences made Handel an honorary member, Bach was admitted only as an ordinary member, and even that not until he had sent in a trial canon. Nor when, in 1743, the concerts from which developed the famous Gewandhaus concerts were inaugurated, was his advice sought. Yet to this master, whose qualifications as a teacher the Town Council of Leipzig impugned, pupils flocked from outside, and no musician of the day thought of passing through the town without paying his respects to the cantor. Besides his most eminent pupils, his two eldest sons, the list included men like Krebs, Agricola, Kirnberger, and Altnikol, who became his teacher's son-in-law. His activity as teacher and composer, and, above all, the happiness of his home life, must have offered Bach the needed respite from his worries with the authorities. His wife helped him copy his music. As his pupil she became an apt player on the clavichord; both she and his eldest daughter sang, and there were the sons and pupils from among whom to make up an orchestra in his own household. Bach possessed at his death five instruments of the clavichord family and many stringed instruments. It is likely that his two concertos for three pianos were written for himself to play with his two eldest sons; several of his church cantatas doubtless were written for his wife and daughter, and there can be no question that the opportunity for music in his congenial household greatly stimulated his faculties for composition. Thus at least part of that famous work, *The Well-tempered Clavichord*, had its origin in Bach's desire to give his sons a thorough course of instruction; and the so-called *French Suites* are among the pieces he wrote for his wife while he was teaching her the clavichord. It was Emanuel who, after becoming a kapellmeister in Berlin, brought about, in 1747, the famous meeting between Bach and Frederick the Great. As soon as the King heard of the composer's arrival, he exclaimed, "Gentlemen, old Bach is here!" and Bach, in his traveling clothes, was immediately summoned into his Majesty's presence. The King had 15 pianofortes in different rooms, and on these Bach improvised and developed in various ways a theme proposed by the King. The composer, who was treated with great distinction, wrote as a souvenir of his visit his *Musical Offering*, a series of compositions on the King's theme. Bach's labors were unremitting almost up to his death. His *Art of Fugue*, begun probably in 1749, was barely finished when he set to work at a quadruple fugue planned on a colossal scale and introducing as one of the subjects his own name in German notation (B A C H, corresponding to our B-flat, A, C, and B). An affliction of his eyesight, which soon resulted in total blindness, stopped the work. It was completed entirely in Bach's spirit by Ferruccio Busoni, and performed in 1911, arranged for organ and orchestra. Ten days before he died, his eyesight suddenly was restored for a short time. His blindness returning, he called his son-in-law Altnikol to him and dictated music for the chorale, *When We are in the Depths of Need*. Later, feeling the hand of death upon him, he had Altnikol change the inscription to *Herewith I Come before Thy Throne*. He died Tuesday, July 28, 1750. The only public notice of the event was a brief minute of the fact entered by the Town Council. His widow was allowed to die a pauper; and when St. John's churchyard, where he was buried, became part of a road, early in the nineteenth century, his bones were carelessly transferred. For almost a century the world was ignorant of the resting place of one of its greatest sons. Not until 1894 were the remains discovered by the merest chance in a vault of St. John's Church itself.

Bach is regarded by organists as the greatest composer for their instrument. In the Lutheran church, while the congregation sustained the melody of a chorale, the organist was supposed to vary the harmonies. Bach's skill at this was prodigious. He collected no less than 240 chorales for use in his household; 138 have come down to us in print, besides those found in his church cantatas and other large works. His fame as an organ composer rests chiefly, however, upon his preludes, toccatas, fantasias, and fugues. Among these organ compositions should be mentioned the *Fantasia and Fugue in G minor* ("Giant"), probably played by Bach in 1720 in Hamburg in Reinken's presence; the *D minor Toccata and Fugue* (Doris); the *E minor Fugue* which is built upon chromatic intervals; and the *E flat or St. Ann Fugue;* besides the *Passacaglia in C minor*. No less an authority than Guilmant has expressed the opinion that there has been no progress in organ composition since Bach, because Bach's achievements in that branch are the highest possible, and as modern to-day, both in the technical equipment they demand of the player and in the effect they produce, as when they were composed. Bach's most generally known works probably are the *D minor Toccata and Fugue*, arranged by Tausig; the *Chromatic Fantasia and Fugue* (D minor) for pianoforte, and the *Well-tempered Clavichord* (*Wohltemperirtes Clavier*) —the two former because they are found in the repertory of every great pianist, the last (48 preludes and fugues through all the major and minor keys), because some acquaintance with it is considered indispensable to a pianist's education. Beethoven mastered it at the age of 11. This famous work, composed partly in 1722, partly about 1740, did not see publication until 1799, nearly 50 years after Bach's death, when it was brought out in London. *Art of Fugue*, begun the year before Bach's death, consists of 15 fugues and 4 canons, all written upon one and the same theme in D minor. Besides these there is a fairly long list of other works for pianofortes, including the charming *French Suites* and *English Suites* and the pretty *Inventions*, showing with how light a touch Bach could handle the smaller forms of his school of composition in composing chamber music and for the orchestra. It is notable that while organ playing usually ruins the pianoforte touch, Bach appears to have been equally proficient on organ and clavichord.

Bach's greatest fame among musicians rests on the religious works composed during the Leipzig period of his career. It is noteworthy that these were composed for the Protestant church, the church of St. Thomas being Lutheran; and that, in consequence, their majesty is enhanced by an august severity in keeping with the simpler forms of Protestant worship. Bach has been compared with Milton, and not inaptly, except that the composer could unbend, as witness his *Coffee* and *Peasant's* cantatas and

his ditty upon his tobacco pipe, *The Edifying Reflections of a Tobacco Smoker*, which he composed as a bit of pleasantry for his wife. Of church cantatas he is understood to have composed nearly 300, a complete cycle for five church years. Of these cantatas some 200 are extant. The loss of so many valuable manuscripts is due to the carelessness of his son Wilhelm Friedemann (q.v.). All except about 30 date from the Leipzig period. He greatly developed this form of church music by freer treatment of the instrumental portions, as well as by his mastery of vocal composition. The chorales are especially rich and beautiful. Of the two *Passions* it has been well said that the *St. John Passion* is the perfection of church music; the *St. Matthew* "reaches the goal of all sacred art" (Poole). The latter, composed in 1729, so much overshadows the former that it is always meant when "Bach's Passion Music" is spoken of; and it is a question whether the majority of musicians consider this *Passion* (composed at intervals during 1733–38) or the *B minor Mass* the greatest of Bach's works. Bach also composed an *Ascension Oratorio* (usually classed with his cantatas), an *Easter* and a *Christmas Oratorio*, the latter in six divisions for performance respectively on Christmas and the two days following, New Year's, the first Sunday of the year, and Epiphany.

Bach is one of those masters that cannot be surpassed, because, as Riemann remarks, "in them the musical feeling and art of an entire epoch are, so to speak, embodied." Bach marks the culmination of the polyphonic, contrapuntal style, and at the same time he is one of the most imposing figures of the new homophonic, melodic style. (See POLYPHONY, HOMOPHONY.) He was living at a time when a desire for greater freedom of expression was chafing at the fetters imposed, by the older church modes, when musicians were beginning to employ the more natural modes of major and minor. It was chiefly Bach who decided the final victory of the natural over an artificial, though time-honored system. In the matter of equal temperature of instruments having a fixed intonation (organ, piano) his advocacy and practical employment of the "tempered" as against the "natural" fifth led to the universal adoption of the former. (See TEMPERATURE; TONALITY.) Thus, by means of the circle of tempered fifths, all the scales were brought into close relation, and the possibility of unlimited modulation was given. This wonderful insight into harmonic relations enabled Bach to impart to his works those subtle effects which even now, after 200 years, after the marvels of Beethoven, Chopin, Wagner, Brahms, fascinate the student. Harmonically Bach towers like a giant above his contemporary Handel, and it is no lack of reverence to say that the harmonic basis of Gluck, Haydn, and Mozart seems rather colorless when compared with that of Bach. Moreover, his melodic invention seems as inexhaustible as the resources of his stupendous technical skill. The more one penetrates into those works, the greater becomes one's admiration. With all the great musicians from Mozart down to Richard Strauss the study of Bach has been nothing less than an obsession. His profound study of the Leipzig cantor enabled Wagner to effect that perfect fusion of the characteristics of the polyphonic and homophonic styles which we admire in *Die Meistersinger*—a fusion which Riemann regards as the ideal to be striven for by future generations. But we believe that this noble ideal exists already as a glorious reality in the work of Brahms. Regarded from the standpoint of our present musical development, Bach looms like a colossus; regarded from the standpoint of his own times, he appears superhuman. Because of this towering greatness, not only his contemporaries failed to appreciate him, but three-quarters of a century elapsed after his death before Bach's real position was recognized in wider circles. The undying glory of having been the first to begin an effective propaganda for the spreading and appreciation of this master's works belongs to Mendelssohn. In 1829 he gave in Berlin an inspired performance of the *Passion According to St. Matthew*, just 100 years after the first performance in Leipzig. The colossal work, neglected and forgotten for a whole century, made a profound impression, and the interest thus aroused grew steadily. Until the day of his death Mendelssohn worked indefatigably for the cause of Bach, and it was again due to his efforts that in 1842 the first statue of the great cantor, the *Altmeister*, as he was then and has since been admiringly called, was erected in Leipzig, near the church of St. Thomas. A fine bronze statue was unveiled in 1884 in his native town of Eisenach. After the discovery of Bach's remains in 1894 Karl Seffner made a special study of the skull and modeled a bust. The same artist cast a full-sized statue in bronze, which was unveiled with imposing ceremonies lasting three days, in May, 1908. This statue stands in the open place behind the church of St. Thomas in Leipzig. In 1850 the centenary of Bach's death was celebrated in a fitting manner. The two brothers, H. and R. Härtel, R. Schumann, O. Jahn, M. Hauptmann, and K. F. Becker founded the Bach Gesellschaft at Leipzig for the purpose of publishing the complete works of J. S. Bach. The first volume appeared in 1851, the sixtieth and last in 1900. With the attainment of the original object the Bach Gesellschaft went out of existence. But new manuscripts were found, and many other matters of importance came up, so that in 1903 a new society under the title "Neue Bach Gesellschaft" was organized at Leipzig. This society has been publishing annually a *Bach Jahrbuch* since 1904, and arranged important Bach Festivals in different cities. Of these the most important one was that of 1907 in Eisenach, when the house in which Bach was born, and which had been bought by the society, was opened as a Bach Museum. Great credit is also due to England for its earnest efforts in behalf of the German master. The English Bach Society even antedates the German Bach Gesellschaft by one year. The moving spirits were W. S. Bennett, J. Hullah, and H. Smart. The object was "(1) The collection of the music composed by J. S. Bach, either printed or in manuscript, and of all works relating to him, his family or his music; and (2) The furtherance and promotion of a general acquaintance with his music by its public performance." In 1870 the society was disbanded, and its valuable library presented to the Royal Academy of Music. In France Bach was entirely unknown to the general public until 1905, when G. Bret founded in Paris the Société Bach. For the cultivation of Bach's music in America, see BETHLEHEM MUSIC FESTIVAL.

**Bibliography.** The standard biography is that of Ph. Spitta, *Johann Sebastian Bach* (2 vols., Leipzig, 1873–80), Eng. trans. by Bell and Fuller-Maitland (London, 1899); C. F. A. Williams, *Bach* (London, 1900); A. Schweitzer, *J. S. Bach, le musicien-poète* (Leipzig, 1905), also Eng. trans. by E. Newman (Leipzig, 1911); C. H. H. Parry, *Johann Sebastian Bach* (New York, 1909); Ph. Wolfrum, *Johann Sebastian Bach* (2 vols., Leipzig, 1910); R. Franz, *Gesammelte Schriften uber die Wiederbelebung Bach'scher und Handel'scher Werke* (Leipzig, 1910).

**BACH,** KARL PHILIPP EMANUEL (1714–88). Styled the "Berlin" or "Hamburg" Bach. He was the third son of Johann Sebastian and was born at Weimar. He attended the famous *Thomasschule* and afterward the University of Leipzig. Then he was sent to Frankfort-a-O. to study law. But there he began his career as musician. In 1738 he went to Berlin, where two years later he was appointed chamber musician to Frederick the Great. In 1767 he became kapellmeister at Hamburg, where he passed the remainder of his life. His most ambitious composition is the oratorio of *Israel in the Wilderness.* The greater portion of his numerous works was written for his favorite instrument, the clavier (the piano of that day). His essay on *The True Method of Clavier Playing* was long a standard work, and contains invaluable information on the styles of playing prevalent at the time. It was reprinted in 1906 by W. Niemann. Clementi professed to have derived from Bach his distinctive style of pianoforte playing. Bach's importance rests upon his piano works, which not only materially advanced the technic of playing, but also assisted in spreading the innovations of Johann Stamitz (q.v.), the real father of modern instrumental music. It was through the works of Bach that Haydn became acquainted with Stamitz's ideas, which he developed still further, and thus established the modern sonata form, the highest of the forms of instrumental music. Bach was a most prolific composer, the number of solo pieces for piano amounting to 210, besides 52 concertos, numerous sonatas and songs. In the field of church music he wrote 22 Passions, 2 oratorios, and many cantatas. Consult Bitter, *K. Ph. E. Bach and W. F. Bach* (Berlin, 1868), and M. Flueler, *Die norddeutsche Symphonie zur Zeit Friedrich des Grossen, und besonders die Werke Ph. E. Bachs* (Berlin, 1909).

**BACH,** WILHELM FRIEDEMANN (1710–84). Known as the "Halle" Bach. He was the oldest of the sons of the great Johann Sebastian, and was born Nov. 22, 1710, at Weimar. He received his entire training from his father, who always regarded him as the most gifted of all his children. From 1733 to 1747 he was organist at St. Sophia's in Dresden, after which he accepted a similar post at St. Mary's in Halle. In this position he remained till 1764, when, because of his irregular habits and addiction to drink, he was dismissed. Afterward he never succeeded in obtaining a position, but drifted about from one city to another until he died in utter degradation in Berlin, July 1, 1784. The manuscripts of a number of his works are preserved in the Royal Library at Berlin. Riemann published a collection of his works for piano, containing concertos, sonatas, fantasies, and a suite. Stradal edited an organ concerto and a fantasy and fugue. All these works show extraordinary talent and a strong individuality. In vol. 43 of the works of J. S. Bach is contained a sonata for two pianofortes, which has subsequently been identified as a work of W. F. Bach. After Johann Sebastian's death in 1750 all his manuscripts were divided between the two sons, W. F. and K. P. E. Bach. While those in the possession of the latter were preserved intact and completely catalogued, the manuscripts given to Wilhelm were almost all lost.

**BACH FESTIVAL.** See BETHLEHEM MUSICAL.

**BACHARACH,** bäg'ä-rag. A town of the Rhine province, Prussia, Germany, picturesquely situated on the left bank of the Rhine, at the entrance of the Steeger valley, 8 miles northwest of Bingen. From the tenth to the sixteenth century it was one of the most important wine markets in the Rhine valley. There are slate quarries in the neighborhood, part of which is still given over to vine culture. Its commerce and population have greatly diminished, but it is noteworthy on account of its interesting historical associations and mediæval remains, which include the commanding castle of Stahleck crowning the hill, the old town walls and towers, the fine ruins of the thirteenth-century Gothic church of St. Werner, and a timbered hostelry of the fifteenth century. Bacharach wine had such high repute that by command a cask was annually sent to Rome for Æneas Sylvius (Pope Pius II), and four tuns were accepted yearly by Emperor Wenzel as tribute for the freedom of the town. Through the Steeger valley, often called the Blucher valley, Blucher pursued the French troops after crossing the Rhine, on Jan. 1, 1814. Pop., 1900, 1904.

**BACHAUS,** WILHELM. See BACKHAUS, WILHELM.

**BACHE,** bāch, ALEXANDER DALLAS (1806–67). An American physicist; born in Philadelphia and was a great-grandson of Benjamin Franklin. He graduated at West Point in 1825, became a lieutenant in the corps of engineers, and remained some time at the Military Academy as instructor. He was employed under Colonel Totten on the fortifications at Newport, where he married Nancy Clarke Fowler. Bache was appointed professor of natural philosophy and chemistry in the University of Pennsylvania in 1828, and was an early member of the Franklin Institute, publishing many valuable scientific papers in its journals. He established the first magnetic observatory in the United States, where the periods of the daily variations of the magnetic needle were fully determined and other interesting observations made. A magnetic survey of Pennsylvania, made by Professor Bache, marks the beginning of the magnetic work since carried on by the United States Coast and Geodetic Survey. In 1836 he became president of the trustees of Girard College, and visited Europe to examine educational systems for the information of the board, who were about to organize that institution. His report, submitted in 1838, was of great value in suggesting improvements in educational methods. Before the college was organized Bache became connected with the public-school system of Philadelphia and developed the system of free education in that city. At the same time he was actively engaged in scientific work, particularly in the examination of meteorological and magnetic phenomena. In 1842 he returned to his professorship

in the university and in 1843 was appointed superintendent of the United States Coast Survey, succeeding F. R. Hassler, the first incumbent of that position. He reorganized and extended the work of the survey and laid the foundations which have brought the service to its present recognized efficiency.

Professor Bache was also a member of the lighthouse board, superintendent of weights and measures, an incorporator and regent of the Smithsonian Institution, vice-president of the United States Sanitary Commission, president of the American Philosophical Society, president of the American Association for the Advancement of Science, a founder and member of the National Academy of Sciences, and associate of many important scientific institutions at home and abroad. He was the recipient of many honors, including the degree of LL.D. from several colleges, and medals from foreign governments and learned bodies. He gave $42,000 to the National Academy of Sciences for the promotion of its work in furthering scientific research. His important works are: *Observations at the Magnetic and Meteorological Observatory of Girard College*, reports on weights and measures, and various essays in the scientific journals and the proceedings of learned societies. Consult Henry, "Memoir of Alexander Dallas Bache," vol. i, *Biographical Memoirs National Academy of Sciences*, reprinted in *Smithsonian Report for 1870*.

**BACHE,** BENJAMIN FRANKLIN (1801–81). An American surgeon, great-grandson of Benjamin Franklin. He graduated at Princeton (1819) and at the medical department of the University of Pennsylvania (1823); became a surgeon in the navy (1828); while on leave was for three years professor of natural science and natural religion in Kenyon College; and for some years was fleet surgeon of the Mediterranean, and later of the Brazil squadron. He established at New York a laboratory which supplied the medical department of the navy, and rendered important service to the Union armies during the Civil War, by running the laboratory at his own expense. He was retired with the relative rank of commodore in 1871.

**BACHE,** FRANKLIN (1792–1864). An American physician and chemist, born at Philadelphia, Pa. He graduated, in 1810, at the University of Pennsylvania; in 1814, at the medical department of the same university. In the latter year he was appointed a surgeon in the United States army. From 1814 until his death he was professor of chemistry at the Jefferson Medical College, and in 1854–55 was president of the American Philosophical Society. He published a *System of Chemistry* (1819); *Introductory Lectures on Chemistry* (1841–52) and other works; and, with G. Wood, prepared a *Pharmacopœia* (1830), which was the basis of the present-day *United States Pharmacopœia* and *United States Dispensatory*. The nineteenth edition of his *Dispensatory of the United States*, a book printed first in 1851, was published in Philadelphia in 1907.

**BACHE,** HARTMAN (1798–1872). An American engineer, born in Philadelphia. He graduated at the United States Military Academy and was appointed colonel of engineers in 1863. In 1865 he was brevetted brigadier-general. He was long employed in topographical surveying, and his engineering works included the Delaware Breakwater and the Brandywine Lighthouse. He retired from active service in 1867.

**BACHE,** RENÉ (1861– ). An American journalist, born at Philadelphia. He studied at Yale and Harvard universities, and after 1889 devoted himself to journalism and literature. He is known as the contributor of a very large number of popular science articles, widely varying in subject-matter, to such periodicals as the *Technical World*, *Harper's Weekly*, *The Scientific American*, and *The Cosmopolitan*.

**BACHE,** SARAH (1744–1808). The only daughter of Benjamin Franklin. During the Revolution she was active in collecting clothing and money for the Patriot army, and at one time employed more than 2000 women and girls in making garments for soldiers. She also served in the hospitals and was widely known for patriotism and benevolence. She married Richard Bache, Franklin's successor as Postmaster-General.

**BACHELET,** bȧsh'lȧ', JEAN LOUIS THÉODORE (1820–79). A French historian, born at Pissy-Pôville, Seine-Inférieure. He was educated at the Ecole Normale, and was professor of history in various institutions, including the Lyceum of Rouen, of which city he was appointed librarian. His publications are numerous, among the most important being *La guerre de cent ans* (1852); *Cours d'histoire* (3 vols., 1868–75); and, with C. Dezobry, the *Dictionnaire général de biographie et d'histoire* (12th ed., 1902); besides the *Dictionnaire général des lettres, des beaux-arts, des sciences morales et politiques* (7th ed., 1902).

**BACHELIER,** bȧsh'lyā', NICOLAS (c.1485–c.1566). A French sculptor and architect. He was born at Toulouse and studied under Michelangelo at Rome. He built a church and a palace at Assier, the main entrance of the church of St. Sernin at Toulouse, and other important works. He was among the first to introduce the Renaissance style into France.

**BACHELIN,** OLIVER. See BASSELIN.

**BACH'ELLER,** IRVING (ADDISON) (1859– ). An American author, born at Pierrepont, St. Lawrence Co., N. Y. He graduated in 1882 at St. Lawrence University (Canton, N. Y.); in 1882–83 was connected with the *Daily Hotel Reporter*, of New York City, and in 1884 was a member of the staff of the Brooklyn *Times*. From 1884 to 1898 he was director of the Bacheller Syndicate for supplying literary material to periodicals and during a portion of that time was also editor of *The Pocket Magazine* and of the *Cosmopolitan*. Subsequently he was on the staff of the New York *World*. Prior to 1900 he had contributed to magazines and the newspaper press poems and sketches and had published two books, *The Master of Silence* (1890) and *The Still House of O'Darrow* (1894). In 1900 his *Eben Holden* achieved a great popular success suggesting that of *David Harum*, less fully repeated in 1901 with *D'ri and I* (originally a serial in the *Century Magazine*). Each of these—the former primarily a character study, the latter a martial romance—finds its setting in northern New York. His later publications include *Darrel of the Blessed Isles* (1903); *Vergilius* (1904); *Silas Strong* (1906); *The Hand-Made Gentleman* (1909); *The Master* (1910); *Keeping up with Lizzie* (1911); *"Charge It"* (1912); *The Turning of Griggsby* (1913).

**BACHELOR,** băch'ē-lẽr (OF. *bacheler*, Fr. *bachelier*, It. *baccelliere*, *baccelliero*, Portug. *baccilar*, all from ML. *baccalaris*, *baccalarius*, a

holder of a small farm or estate called in Low Lat. *baccalaria*. The latter was probably derived from Low Lat. *bacca* for Lat. *vacca*, cow, and thus meant 'grazing land'). The term was applied to (1) tenants of certain portions of church lands, called *baccalaria*, a fee of an inferior kind; (2) monks who had not yet taken the full vows of monasticism; (3) persons in the probationary stage of knighthood—not esquires simply, but knights who, for lack of means or from nonage, had not yet raised their banner in the field (*levé bannière*); (4) students who had completed the first grade of their university career, in this sense the word was afterward changed to read *baccalaureus;* (5) unmarried men who, because of their solitary condition, were regarded as candidates or probationers for marriage. It is the last meaning that the term "bachelor," at present, most often bears. Regarded as a class in the community, bachelors have formed the subject of legislation from the earliest times. Upon the principle that every citizen is bound to rear up legitimate children to the state, penalties have often been imposed upon male celibates in various countries. In proportion as the interests of the state were regarded above those of the individual, the enforcement of marriage would be made more or less severe. In ancient Sparta it was considered a punishable crime not to marry, or to marry too late in life; and in early Athens celibacy, though not severely punished, was discouraged. At Rome marriage was fostered by positive penalties imposed on unmarried men, and sometimes even on women, as well as by discrimination in favor of heads of families. In the allotment of the Campanian lands by Julius Cæsar portions were granted only to the fathers of three or more children. Under Augustus a law was enacted prohibiting unmarried men below the age of 60 and single women under 50 from taking possession of a legacy; and this prohibition applied even to widows, who, in order to secure their part of the deceased husband's estate, were forced to marry again within two years. There are numerous instances in Great Britain of special taxes being imposed upon bachelors and widows, with a view, however, more to the increase of revenue than for any other object. In France, where the problem of depopulation has been of such serious moment as to threaten the very position of the state among the Great Powers of Europe, frequent attempts have been made to impose taxes upon bachelors, but with very little success. See BACHELOR'S DEGREE.

**BACHELOR.** See CRAPPIE.

**BACHELOR,** KNIGHT (Fr. *bas chevalier*). The lowest grade of knighthood, now only bestowed in the United Kingdom. It has frequently been conferred for no weightier service than carrying a congratulatory address to court. See KNIGHT.

**BACHELOR OF SAL'AMAN'CA, THE.** A novel by Le Sage, published in 1736. Le Sage pretended that it was drawn from an old Spanish MS., but its inspiration need be traced no further back than the ingenious brain of the author of *Gil Blas.* It was his last work.

**BACHELORS' BUTTONS.** A name commonly applied to a species of *Gomphrena* ('globe amaranth') cultivated from India. Various other plants, both cultivated and wild, are also called "bachelors' buttons," as species of *Ranunculus* ('buttercup'), *Lychnis, Polygala, Cichorium* ('chicory'), and *Centaurea.*

**BACHELOR'S DEGREE.** One of the oldest of academic distinctions, the exact significance of which has varied in different countries and in different periods in the same countries. Originally it was not a degree conferred by the university but merely a recognition of a candidate's ability to proceed to a higher degree. During the fifteenth century it became well defined as a minor degree and in general it has been conferred at the close of the first stage in a liberal education and is supposed to indicate that the recipient is proficient in certain fundamental branches. The original form of the degree was Bachelor of Arts (B.A.), and usually it is essential that this degree should be taken before proceeding to the higher degree of Master of Arts, or Doctor of Philosophy. In France there are two forms for the baccalaureate degree—*bachelier ès lettres* and *bachelier ès sciences.* Great Britain, while conservative about the B.A. degree, recognizes also B.Sc., and confers the bachelor's degree in professional courses. So, too, in the United States there are Bachelors of Law (LL.B. or B.L.), Bachelors of Divinity (B.D. or S.T.B.), Bachelors of Medicine (M.B.), etc. Here, too, where academic degrees are but slightly protected by law, many modifications of the baccalaureate degree have been employed to indicate the completion of certain special courses of study. The scientific schools have given the degree of Bachelor of Philosophy (as at Yale, since 1852), Bachelor of Science (as at Harvard, since 1851), and in many places the degree of Bachelor of Letters is conferred upon those whose studies are not scientific or classical, but are based on modern literature. Bachelor of Science (B.S.) is an established degree in almost every college and university, while Bachelor of Philosophy (Ph.B.) and Bachelor of Letters (B.L. or Litt.B.) have in the majority of cases been introduced only to be discarded. The bachelor's degree has also been given in pharmacy, agriculture, music, veterinary medicine, and many other subjects; but there is much opposition to this use of the traditional "baccalaureate," and the tendency is more and more towards its limitation.

**BACHER,** bäĸ'ẽr, WILHELM (1850–1913). A Jewish theologian and Orientalist, born in Lipto-Szent-Miklos in Hungary. He was educated in the universities of Budapest and Breslau and at the Jewish Theological Seminary of the latter city. In 1877 he became professor and in 1912 director of the rabbinical public schools of Budapest. His works include: *Nizamis Leben and Werke* (1872); *Die Agada der Babylonischen Amoräer* (1878); *Die Agada der Tannaiten* (2 vols., 1889–90; vol. i, 2d ed., 1903); *Die Agada der Palästinensischen Amoräer* (3 vols., 1892–99); *Die Anfänge der Hebräischen Grammatik* (1895); *Ein Hebräisches Worterbuch aus dem Vierzehnten Jahr-hundert* (1900); *Die Agada der Tannaiten und Amoräer; Bibelstellenregister* (1902); *Aus dem Wörterbuche Tanchum Jeruschalemis* (1903).

**BACHERACHT,** bä'ĸe-räkt, THERESE VON. See LÜTZOW, THERESE VON.

**BACHET,** bà'shā', CLAUDE-GASPAR, SIEUR DE MÉZIRIAC (1581–1638). A French mathematician and philologist. He was born in Paris and is said to have belonged in his youth to the order of the Jesuits. At the age of 20 he was teaching rhetoric in the College of Milan, but soon afterward settled in Paris, where he became a member of the French Academy from the time

of its foundation (1635). He published some literary works, among which is *Epîtres d'Ovide en vers français, avec des commentaires fort curieux* (Bourg-en-Bresse, 1620; reprinted at The Hague, 1716, with other of his works). In mathematics he was the first in Europe systematically to undertake the solution of indeterminate linear equations, and his commentaries were a point of departure for the work of Fermat in his theory of numbers. Bachet published *Les problèmes plaisants et délectables qui se font par les nombres* (Lyons, 1612; 5th ed., Paris, 1884); *Diophanti Alexandrini Arithmeticorum Libri Sex et de Numeris Rectangulis Liber Unus* (Paris, 1621–70). He also left a manuscript entitled "Elementorum Arithmeticorum Libri XIII (Bibliothèque de l'Institut)," extracts of which were published in the *Bollettino Boncompagni* (1879).

**BACHIAN.** See BATJAN.

**BACHMAN,** bāk'mȧn, JOHN (1790–1874). An American naturalist and clergyman. From 1815 until his death he was pastor of a Lutheran church in Charleston, S. C. He was assistant to Audubon and chief author of the work on North American quadrupeds. Among his own works are *A Defense of Luther and the Reformation* (1853) and *Characteristics of Species and Genera as Applicable to the Doctrine of the Unity of the Human Race* (1854).

**BACHMUT,** bäk-mo͝ot'. See BAKHMUT.

**BACHO,** bā'kō. See BACONTHORPE, JOHN.

**BÄCHTOLD,** bĕk'tôlt, JAKOB (1848–97). A German literary historian, born at Schleitheim, Switzerland. He studied at Heidelberg, Munich, Tübingen, Paris, and London, and in 1872 was an instructor in the gymnasium at Solothurn. In 1888 he became professor of the German language and literature at Zürich. His principal work is *Geschichte der deutschen Litteratur in der Schweiz* (1887–92), and his other important publications include *Deutsche Handschriften aus dem Britischen Museum* (1873) and *Gottfried Kellers Leben* (3 vols., 1894–97). He also published a critical edition of Goethe's *Götz von Berlichingen* (1882); *Iphigenia* (1883); *Dichtung und Wahrheit* (1890–91). He was associate editor, with Vetter, of the *Bibliothek älterer Schriftwerke der deutschen Schweiz und ihres Grenzgebietes.* After his death Vetter published *Kleine Schriften von Jakob Bächtold* (1899).

**BACHUONE,** bȧ-chwō'nȧ, ARNOLDO. See VILLANOVANUS, ARNOLDUS.

**BACIL'LUS.** See BACTERIA; CHOLERA; COLON BACILLUS; TUBERCULOSIS; SERUM THERAPY.

**BACIOCCHI,** bȧ-chō'kē, MARIE ANNE ELISA BONAPARTE. See BONAPARTE, FAMILY OF.

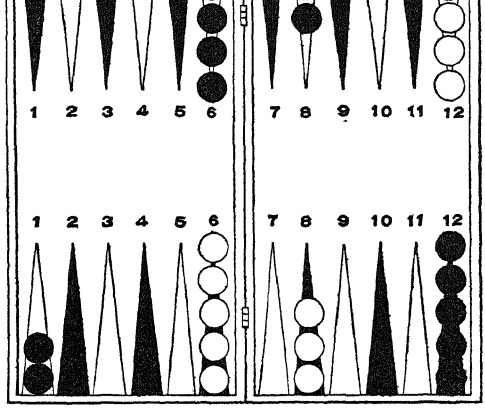
**BACK,** SIR GEORGE (1796–1878). A famous English Arctic explorer. He was born at Stockport, England. In 1819 and 1825 he accompanied Franklin in his expeditions to the north coast of America. He volunteered to the government to go in search of Captain Ross, who was supposed to have been lost in his attempt to discover the Northwest Passage; and on the 28th of June, 1833, he started from Norway House, a station of the Hudson's Bay Company. After passing a terrible winter with his companions at Slave Lake, he discovered, in 1834, Artillery Lake and the Great Fish River, or Back's River, which he followed to the Frozen Ocean. Being hindered by the ice from proceeding along the coast as far as Cape Turn-again, he returned by the river; but although he had received news of the return of Captain Ross, he continued his explorations in the Northern Sea, and did not return to England until 1835, when he was raised to the rank of post-captain for his services. In 1836 and 1837 he further explored the Arctic shores—the Geographical Society, in the latter year, bestowing its gold medal upon him. Two years afterward he was knighted. He was made an admiral in 1857. He was an able artist and descriptive writer and wrote an illustrated *Narrative of the Arctic Land Expedition to the Mouth of the Great Fish River* (1834–35), and *Perils and Escapes of H.M.S. Terror* (1836–37).

**BACK BAY.** A former inner harbor of Boston, Mass., drained and filled in (1856–86), laid out in straight and wide streets and squares, and now the most exclusive residential district of the city. In it many of the finest streets, churches, and public buildings are situated, the Public Garden and Copley Square being prominent features.

**BACK'BITE,** SIR BENJAMIN. A character in Sheridan's *School for Scandal.* He is an emasculated creature, with a vinegary tongue, deeply versed in all manner of evil speaking, lying, and slandering. Crabtree, his uncle, Mrs. Candour, and himself are the leading members of the "school." He affects to be a poet and wit.

**BACKER,** bäk'ẽr, JAKOB (1608–51). A Dutch painter. He was born at Haerlingen and was a pupil of Lambert Jakobsz at Leuwarden and afterward of Rembrandt at Amsterdam, where he usually resided. Under the latter's influence he painted real masterpieces, such as the "Lady Regents of the Amsterdam Orphan Asylum," still in situ, and the fine "Guild of Archers," in the Town Hall (1642), and some of his portraits. But his art afterward became fashionable and declined. His nephew, ADRIAN BACKER, of Amsterdam (1638–86), was also a successful portrait painter, whose historical subjects are imitations of the Italians.

**BACK'GAM'MON.** One of the most ancient and widespread dice games, of which three schools survive—the Russian, Turkish, and English. It is sometimes called "tric-trac," though this is properly a distinct variety of the game, and in England was known as "tables" until the seventeenth century. The word "backgammon" has been ascribed to the Welsh tongue, in which it is said to signify "little battle." Strutt as-




BACKGAMMON BOARD.

cribes the term to the Saxon "bac" and "game," —i.e., back game,—so denominated because the performance consists in the two players bringing their men back from their antagonist's table into their own; or because the pieces are sometimes taken up and obliged to go back—i.e., reënter at the table they came from.

The backgammon board consists of two parts or tables, known as the inner or home table and the outer table. Each table possesses 12 points, 6 at each end. The game is played by two persons, each of whom has 15 "men." In beginning the game the "men" are placed on certain points on the tables, directly opposite each other. The game is played with 2 dice, which are common to both players; but each player uses his own dicebox. The throws are alternate. If a player throws "doublets," or both dice of one number, double the number of dots is reckoned; thus, by a throw of 2 aces, the player does not count 2, but 4. Each player counts round from the right hand or ace point of the other. The object of the game is for each player to get all his "men" played round into his own left-hand table, removing them from point to point according to the throws of the dice. In throwing, the number upon each die turned up may be reckoned by itself, or collectively with the number on the other side. Thus, if 4 be thrown by one side, and 6 by the other, one "man" can be advanced 4 points, and another 6 points; or one "man" can be advanced 10 points, always providing that a point is open to suit this movement to it. No point can be moved to if covered by 2 "men" belonging to the adversary. If covered by only one "man," which is called a "blot," then that "man" can be "hit"—i.e., removed from the point, and placed on the bar between the tables, its place being taken by the "man" who has won it. The removal of a "man" to the bars throws a player considerably behind in the game, because the "man" must remain out of the play till the dice turn up a number corresponding to an open point on the adversary's table. There are two kinds of victory—winning the "hit" and winning the "gammon." The party who has played all his "men" round into his own table, and by fortunate throws of the dice has borne or played the "men" off the points first, wins the "hit." The "gammon" may be explained as follows: When you have got all your "men" round to your own table, covering every point, and your adversary has a "man" out, then you are enabled to "bear" or lift your men away. If you can bear all away, so as to clear your table before the adversary gets his "man" placed by a throw on your table, you will win the "gammon." If the adversary has been able to bear one before you have borne all your "men," it reduces the victory to a "hit." Two "hits" are reckoned equal to one "gammon" in playing matches. Consult Pardon and Anderson, *Backgammon and Draughts* (New York, 1889).

**BACKHAUS,** bäk'hous, WILHELM (1884–1921). A noted German pianist. He was born March 26, 1884, at Leipzig. When seven years of age, he received regular piano instruction from A. Reckendorf, and continued with him even during the four years which he spent at the Conservatory of Leipzig (1894–98). After graduation he spent one year with Eugen d'Albert in Frankfurt. His concert career began in 1900, when his extraordinary powers won immediate recognition. In England his appearances created a sensation, so that he was appointed at the age of 21 a professor of piano at the Royal College of Music in Manchester. This position he held only one year, for in that year he competed for and won the much-valued Rubinstein Prize (1905). Thereafter he devoted all his time to concert tours. In 1912 he visited America, where he had to compete with such artists as Busoni, De Pachmann, and Godowsky. Before he reached his thirtieth year Backhaus was generally regarded as among the very greatest of living pianists, his tremendous technic being entirely eclipsed by marvelous tone coloring, wonderful poetic feeling, and supreme intellectual grasp.

**BACKLUND,** bäk'lund (JOHAN) OSKAR (1846–1916). A Swedish astronomer, born at Lenghem, Sweden. He became lecturer at the University of Upsala (1875), assistant at the Stockholm Observatory (1876), observator at the Dorpat Observatory (1876), adjunct-astronomer at the Observatory of Pulkowa, Russia, and in 1895 its director. In 1887 he was made astronomer of the Academy in St. Petersburg. He spent some years in investigating the progressive decrease in the period of Encke's comet and in formulating a "theory of disturbances." One of his principal publications is the treatise entitled *Observations de Pulkowa* (1888). In 1906 was published *The Development of Celestial Mechanics during the Nineteenth Century.*

**BACK RIVER.** See GREAT FISH RIVER.

**BÄCKSTRÖM,** bĕk'strĕm, PER JOHAN EDVARD (1841–86). A Swedish author, born at Stockholm and educated at Upsala. He published several volumes of verse, including *Lyriska Dikter* (1870). His dramas, of which the chief is the tragedy, *Dagvard Frey* (1876; Ger. trans. by Attinghausen, 1879), were long popular. He made translations from Ponsard, Victor Hugo, and others.

**BACK'US,** ISAAC (1724–1806). An American clergyman and author. He was born at Norwich, Conn. He left the regular Congregational body for the Separatists, or New Lights, and these sympathized warmly with the Baptists, whose leader he became, and by his own exertions largely increased the prosperity of the denomination. He was a strong advocate of the entire separation of church and state and went before the Continental Congress in 1774 to ask for the Baptists the same privileges that were granted to other sects. Among his numerous writings, *A History of New England, with Especial Reference to the Denomination of Christians Called Baptists* (3 vols., Boston, 1777–96; reprinted, 2 vols., Newton, Mass.) is the most important.

**BACKUS,** TRUMAN JAY (1842–1908). An American educator. He was born at Milan, N. Y., graduated at the University of Rochester in 1864, and was professor of rhetoric and English literature at Vassar College from 1867 to 1883. In 1883 he was appointed president of Packer Collegiate Institute (Brooklyn, N. Y.). He was one of the incorporators of the Brooklyn Institute of Arts and Sciences and at one time president of the Headmasters' Association.

**BACLER D'ALBE,** bȧ'klȧr' dȧlb', LOUIS ALBERT GHISLAIN, BARON (1762–1824). A French painter, soldier, and cartographer. He published a *Carte du théâtre de la guerre en Italie* (54 parts, 1802), and rose to be general of brigade under Napoleon, in all of whose campaigns he served. His most noted paintings, "The Battle of Arcola" and "The Battle of

Rivoli," are in the Versailles Gallery. He published *Souvenirs pittoresques contenant la campagne d'Espagne* (1824), a series of lithographic views, and other similar works.

**BACOLOD**, bä-kō'lōd, or **BACOLOT**, bä-kōlōt. The capital of the province of West Negros (area, 3112 square miles; pop., 231,512) on the island of Negroes, Philippines. It is situated on the west coast and had in 1903 a population of 11,960 (Map: Philippine Islands, D 5). It is 26 miles by water from Iloilo.

**BACOLOR**, bä'kō-lōr'. The chief town and the capital of the province of Pampanga, Luzon, Philippines (Map: Luzon, D 7). It is situated 33 miles northwest of Manila, with which it is connected by road. It has a telegraph station and is connected by rail and highway with important towns on the island. Pop., 1903, 13,493.

**BA-CÓN.** A town in the Philippines, in the province of Sorsogon, Luzon. It is situated on the gulf of Albay, about 22 miles southeast of Albay, the capital, in a fertile agricultural district. Pop., 1903, 14,536.

**BA'CON,** ALICE MABEL (1858– ). An American writer and teacher. She was born at New Haven, Conn., the daughter of the Rev. Dr. Leonard Bacon. She taught at Hampton Institute from 1883 to 1888, and in 1888–89 at the Peeresses' School, Tokio, Japan, where she wrote *Japanese Girls and Women* (1891) and *A Japanese Interior* (1893). She returned to Hampton Institute in 1890 and founded the Dixie Hospital for the training of colored nurses. In 1900–02 she taught in the Girls' High School, Tokio, Japan, and afterward lectured on Japanese subjects in this country. She wrote *In the Land of the Gods* (1905), and edited *Human Bullets, a Soldier's Story of Port Arthur* (1907).

**BACON,** AUGUSTUS OCTAVIUS (1839–1914). An American legislator, born in Bryan Co., Ga. He graduated from the University of Georgia (A.B. 1859; LL.B. 1860); served in the Confederate army during the Civil War; entered upon the practice of law in Macon and became prominent in State politics. For a number of years he was speaker of the Georgia House of Representatives, and several times he served as delegate to Democratic State and national conventions. Elected to the United States Senate in 1894, he was reëlected for six-year terms in 1900, 1907, and 1913—this last time as the first Senator ever chosen by direct vote of the people. Senator Bacon came to be recognized as one of the most eminent lawyers of the Upper House, conspicuous especially for his knowledge of constitutional law. Upon the death of Vice-President Sherman he alternated with Senator Gallinger as president pro tempore of the Senate, and in this capacity presided at the impeachment proceedings against Judge Archbald (q.v.) in 1912. A year later, while he held the chairmanship of the important Foreign Relations committee, his conservative attitude towards troubled Mexican affairs was of great assistance to President Wilson in delaying radical action by Congress. Senator Bacon was made a regent of the Smithsonian Institution and a trustee of the University of Georgia.

**BACON,** BENJAMIN WISNER (1860– ). An American theologian. He was born at Litchfield, Conn., and graduated at Yale (College, 1881; Divinity School, 1884). After serving in pastorates at Old Lyme, Conn. (1884–89), and at Oswego, N. Y. (1889–96), he was made an instructor in New Testament Greek at Yale Divinity School and became in 1897 professor of New Testament criticism and exegesis. The degrees D.D., Litt.D., and LL.D. were conferred upon him. Besides contributions to the *Hibbert Journal* and to the *American Journal of Theology* (of both of which he was chosen an editor), his writings include: *The Genesis of Genesis* (1891); *Triple Tradition of the Exodus* (1894); *The Sermon on the Mount* (1902); *The Story of St. Paul* (1904); *An Introduction to the New Testament* (1907); *The Founding of the Church* (1909); *The Fourth Gospel in Research and Debate* (1909); *Jesus the Son of God* (1911); *The Making of the New Testament* (1912); *Theodore Thornton Munger* (1914).

**BACON,** DELIA SALTER (1811–59). An American author (born at Tallmadge, Ohio), the sister of Leonard Bacon. She wrote *Tales of the Puritans* (1837), and other works of fiction, and in 1857 published in London her *Philosophy of the Plays of Shakespeare Unfolded*, with a preface by Nathaniel Hawthorne. In this book she zealously advocated the theory that Francis Bacon wrote the plays of Shakespeare, a theory afterward exploited by Ignatius Donnelly (q.v.). Though this theory was not original with her, she was the first to give it general currency. Consult Hawthorne, "Recollections of a Gifted Woman," in *Our Old Home* (Boston, 1863), and Theodore Bacon, *Delia Bacon* (Boston, 1888).

**BACON,** FRANCIS, BARON VERULAM, VISCOUNT SAINT ALBANS (1561–1626). A celebrated English philosopher. He was born in London on Jan. 22, 1561. His father, Sir Nicholas Bacon, was Lord Keeper of the Great Seal, and his mother was the learned Ann Cooke, sister of Burleigh's (see CECIL, WILLIAM) wife. In early childhood Bacon manifested superior powers and an ardent love of knowledge; his precocious intelligence was so great, and his sedateness so remarkable, that Queen Elizabeth took pleasure in calling him her "young lord keeper." In his thirteenth year he was sent to the University of Cambridge, which he quitted after a residence of but two years. On leaving the university in 1576 he went to Paris in the suite of Sir Amias Paulet, the English Ambassador, and during his residence there he is said to have studied statistics and diplomacy. The sudden death of his father in 1579 recalled him to England, where, after failing to procure from the government a provision which would enable him to devote himself to science and literature, he betook himself for several years to the study of law and was admitted to the bar in 1582. Two years afterward he entered Parliament from the borough of Melcombe Regis. In 1584 or 1585 he published a "Letter of Advice to Queen Elizabeth," in which he advocated "that whosoever would not bear arms against all foreign princes, and namely the Pope, that should anyway invade her Majesty's dominions, should be a traitor." In 1586 he became a bencher of Gray's Inn, and in 1589 wrote another letter, this time in defense of Elizabeth's course in church matters. But neither these letters nor the support of the Earl of Essex, whose favor he had won, could counteract the effect produced on the Queen and the Lords by his opposition in Parliament to some taxation measures in which the government was interested. A chance was given him to apologize for this act of antagonism, but he resolutely refused, and thereby lost an opportunity to be-




**LORD BACON**

FROM AN ENGRAVING BY JACOBUS HOUBRAKEN

come Attorney-General (1594). Another failure to apologize was followed by failure to secure the solicitor-generalship, although he was now supported by both Essex and Burleigh. These facts it is well to keep in mind, because they show a strength of character in striking contrast to the glaring sycophancy of his conduct in later years. When Essex found that he could do nothing for his favorite at court, he presented him with a private estate worth about £1800, and also supported him in a suit for the hand of Lady Hatton, whom Bacon wished to marry for her wealth. Lady Hatton, however, preferred Coke, Bacon's future enemy. In spite of his readiness thus to accept the patronage of Essex, Bacon acted as Queen's counsel against his friend when the latter was brought to trial for his conduct in Ireland. His motives in this matter have been differently interpreted. Some say that, because he was straitened in his circumstances at this time, he was anxious to conciliate the court. Others maintain, with perhaps more justice, that he took this stand as being the only course open to him for securing the least severe sentence possible for his old friend. Essex himself, however, did not concur in this interpretation of Bacon's conduct. The result of this first trial of Essex was that he was set at liberty; only, however, shortly afterward to be tried again—this time for conspiracy. Bacon was now, without doubt, largely instrumental in securing for the crown the verdict against the accused. The merits of the case cannot be discussed here. Bacon asserted that his official position made it necessary that he should ignore ties of friendship; but then perhaps he should not have allowed himself to be put in such a position. Furthermore, the conscientious performance of official duties at the expense of his personal advantage was by no means a conspicuous trait in his character. After the Earl's execution he wrote, at the request of the Queen, *A Declaration of the Practices and Treasons Attempted and Committed by Robert, Earl of Essex*, which was printed by authority, but with so many changes made by another hand that Bacon cannot justly be held responsible for its authorship.

With the advent of the reign of James I, a new opportunity opened to Bacon, and by paying court to the King he made rapid progress. He was knighted in 1603; and in the following year a pension of £60 was attached to his office of learned counsel. In 1606 he succeeded in his ambition to marry a wealthy woman by winning the hand of Alice Barnham. In 1607 he secured the long-coveted solicitor-generalship, and thus came into the possession of what, in money of to-day, would amount to £4000 a year. This appointment Bacon had probably secured by his defense of royal supremacy in a dispute concerning the King's jurisdiction over some border counties. From now on he volunteered much advice to his sovereign, who, however, refused to be guided by him. Bacon's advice was marked by a strange mixture of great wisdom and unworthy trivialities. He showed wonderful insight into the political situation and suggested plans which, if carried out, might have averted much of the trouble that ensued. But James was not a king to listen to suggestions conflicting with his inclinations, while Bacon unfortunately did not possess a character that could give weight to his advice. In the coming struggle Bacon became more and more obsequious. He justified himself in his own eyes by the excuse that he was keeping in touch with the King for the good of his country; but it was now obvious to every patriot that no good would come to his country from the willful King. In 1613 Bacon was appointed Attorney-General; and in this new office he soon became entangled in dispute with Coke on constitutional principles, and made himself obnoxious to the people at large by his unscrupulous cupidity. His subservience to the King, however, served him in good stead for a few more years. In 1617 he was appointed to the position his father had held before him, that of Lord Keeper of the Great Seal, and in the year following he attained the high dignity of the Lord Chancellorship and the title of Baron Verulam. In 1621 he was created Viscount St. Albans. The enjoyment of his new honors was, however, very brief. The storm which had been gathering against the government broke first on Bacon's head. On the assembling of Parliament he was charged with bribery. During the trial he himself confessed to the Lords that "there had been a great deal of corruption and neglect," for which he "was heartily and penitently sorry." On the first of May he was deprived of the Seal, and then followed sentence on him, condemning him to pay a fine of £40,000, to be imprisoned during the King's pleasure, and to be excluded from Parliament and from court. The fine, however, was remitted by the King, and the imprisonment lasted only two days. Some time afterward he was even allowed to appear at court. It seems that he now conceived the hope of reentering political life; but even in those debauched days this was impossible, and he thenceforth devoted himself to literature and science. He died, April 9, 1626, of a cold caught in making an experiment to test the efficacy of snow to preserve flesh.

The first edition of his *Essays* appeared in 1597; his two books on the *Advancement of Learning* in 1605 (this work was afterward treated as the first part of the projected *Instauratio Magna*); his *De Sapientia Veterum* ('Wisdom of the Ancients') in 1609; a revised edition of the *Essays* in 1612, while the final form was given to them in 1625; the *Novum Organum* (so called with reference to Aristotle's *Organon*) appeared in Latin in 1620 and was treated as the second part of the *Instauratio*. The third part of this comprehensively planned work, or at least a section of the third part, appeared in 1622, under the title *Historia Naturalis et Experimentalis ad condendam Philosophiam; sive Phænomena Universi*. Of the other three contemplated parts of the *Instauratio* only two prefaces remain. In 1622 he also published his chief historical work, *History of the Reign of Henry VII*. In 1623 appeared his *De Augmentis Scientiarum*, a Latin translation and extension of his *Advancement of Learning*. His last work, which was published posthumously (1627), was *Sylva Sylvarum*, a book which showed very conclusively that he was not able, in practice, to live up to his scientific theory. The *New Atlantis*, which appeared at the same time with the last-mentioned work, had been written as early as 1617. Besides these, he wrote several minor books and papers. His writings deal with a wide range of subjects, from jurisprudence—which he treated not as a mere lawyer, but as a legislator and philosopher—to morality and medicine. The

*Essays* are a treasury of rich knowledge of human relations, and the style in which they are written has seldom been equaled by any English writer.

Bacon's reputation as an original philosopher, as an epoch maker in philosophic and scientific thought, was higher a generation or two ago than it is now. Yet his *Novum Organum* has done, perhaps, as much as any other single work toward inculcating into science the spirit of unbiased, accurate, and careful observation and experimentation. In it he maintains that all prepossessions, called "idols," must be abandoned, whether they be the common property of the race due to common modes of thought ("idols of the tribe"), or the peculiar possession of the individual ("idols of the cave"); whether they arise from too great a dependence on language ("idols of the market place"), or from tradition ("idols of the theatre"). These idols once discarded, the seeker after truth must proceed to interrogate nature, not contenting himself with accepting what she has to say of her own accord. He must collect facts, arrange them in order, and then advance to the discovery of the laws that control their workings. This cannot be accomplished by the *inductio per enumerationem simplicem*, or mere inventory of all possible cases of the phenomena under investigation; but negative instances, i.e., cases in which the phenomena are absent, must be examined to discover wherein these instances differ from the affirmative instances—all this with a view to discover the "form" of the phenomena, or their abiding essence. This insistence upon the formal cause has its significance in connection with Bacon's exclusion of final causes or purposes from the domain of natural science. Not that purpose has no existence in the universe. On the contrary, Bacon believed in an overruling Providence with a perverse piety ill in accord with his life. But though religion can imagine the purposes of God, the business of the scientist is to understand the causal sequences of nature as controlled by the essences of phenomena. In ethics Bacon is to be regarded as the forerunner of the English Hedonistic school (see HEDONISM), of which his disciple, Hobbes, is usually regarded as the founder. Bacon's own scientific work amounted to little. It is true that he propounded the theory that heat is a form of motion, but this suggestion seems rather to have been a happy guess than a belief scientifically grounded. He was an opponent of the Copernican system of astronomy, which he regarded as a strange fancy; and he seems to have known nothing of the work of Kepler. His enthusiasm for science was not disinterested, but was due to a belief that "knowledge is power"; that human conditions can best be improved by a more thorough acquaintance with the world in which human life must be lived.

Bacon's collected works were first published by Blackbourne in 1730; another collection, with a life, by Mallet, in 1740; a handsome but ill-arranged edition is that of Montagu in 17 vols. (London, 1825–36); the best is that edited by Spedding, Ellis, and Heath, in 7 vols. (1857–59), with *Life and Letters* (7 vols., ed. by Spedding, 1861–74). A noted review of Bacon's character and works is to be found among Macaulay's *Essays*. For more temperate estimates consult: Fowler, "Bacon," *English Philosophers Series* (London, 1881); Church, "Life of Bacon," *Men of Letters Series* (New York, 1884); Abbott, *Francis Bacon: An Account of his Life and Works* (London, 1885); and John Nichol, *Francis Bacon: His Life and Philosophy* (London, 1888–89).

**BACON,** HENRY (1866–1924). An American architect, born at Watseka, Ill. He graduated from the University of Illinois in 1888, and, as winner of the Rotch traveling scholarship, spent two years of study in Europe. From 1885 to 1888 he was in the office of Chamberlin & Whidden in Boston, and from that time until 1897 (with the exception of one year) was with the famous firm of McKim, Mead, & White. He severed this connection to help form the firm of Brite & Bacon. This partnership was dissolved in 1903, and Mr. Bacon began practice alone. He designed many important buildings and was successful competitor for the design of the Lincoln Memorial at Washington (1913). He was made a fellow of the American Institute of Architects and in 1913 a member of the National Institute of Arts and Letters.

**BACON,** JOHN. See BACONTHORPE, JOHN.

**BACON,** JOHN (1740–99). A British sculptor, born in London. In 1769 he received the first gold medal for sculpture awarded by the Royal Academy, of which he was soon after made a member. Among his principal works are two busts of George III—one at Christ Church, Oxford, the other in the University Library at Göttingen—and monuments of Lord Chatham in Westminster Abbey and in the Guildhall, of Dr. Johnson in St. Paul's Cathedral, and of Blackstone at Oxford. He made important improvements in the technical methods and processes of architecture and invented an instrument for use in transferring the model form to the marble. Consult R. Cecil, *Memoirs of John Bacon, R.A.* (London, 1811).

**BACON,** JOHN EDMUND (1832–97). An American lawyer, born at Edgefield, S. C. He graduated at South Carolina College in 1851 and soon afterward was admitted to the bar. In 1858 he was appointed secretary to the United States Legation at St. Petersburg, but resigned to enter the Confederate army, in which he rose to the rank of major. He was sent with Gov. James L. Orr to Washington in 1866 to bring about the restoration of South Carolina to the Union. In 1867 he was elected district judge, but was presently deposed by the Federal departmental commander. He was, in 1886, appointed United States chargé-d'affaires in Uruguay and Paraguay.

**BACON,** JOHN MACKENZIE (1846–1904). An English clergyman, scientist, and aëronaut. He studied at Trinity College, Cambridge; was ordained priest of the English Church in 1870. He gave up his clerical work in 1889 as a result of the opposition aroused by his publication of *The Curse of Conventionalism: a Remonstrance by a Priest of the Church of England.* From that time on he devoted himself to the study of astronomy and aëronautics. Two eclipse expeditions of the British Astronomical Association—that to Buxar, India, in 1898, and that to Wadesboro, N. C., in 1900—were made under his direction. In 1899 he accomplished the record voyage in English ballooning. In his ballooning he proved that sound travels less rapidly upward than downward, and that the ocean bottom is visible and can be photographed from great heights. He published *By Land and Sky* (1900), which contains narratives of his

ballooning exploits and the results of many of his investigations in meteorology, acoustics, and other subjects; and *The Dominion of the Air* (1902).

**BACON,** JOSEPHINE DODGE DASKAM. See DASKAM, JOSEPHINE DODGE.

**BACON,** LEONARD (1802–81). An American clergyman and writer. He was born at Detroit, Mich.; graduated at Yale in 1820 and at Andover in 1823. From 1825 till his death he was pastor of the First Church in New Haven; from 1866 to 1871, acting professor of revealed theology in Yale, and afterward lecturer on ecclesiastical polity and American Church history. He was one of the editors of the *Christian Spectator*, and later an editor of the *New Englander;* also, for 15 years, one of the editors of the New York *Independent*. Dr. Bacon edited the *Select Practical Writings of Richard Baxter, with a Life of the Author* (New Haven, Conn., 1831); and of his other writings may be mentioned, *Thirteen Historical Discourses on the Completion of Two Hundred Years, from the Beginning of the First Church in New Haven, with an Appendix* (New Haven, Conn., 1839); *Slavery Discussed in Occasional Essays from 1833 to 1846* (New York, 1846), and particularly *The Genesis of the New England Churches* (New York, 1874)—an important volume.

**BACON,** LEONARD WOOLSEY, D.D. (1830–1907). An American clergyman, born in New Haven, Conn.; a son of Leonard Bacon. He graduated at Yale in 1850, and was pastor of the First Church in Litchfield, Conn., of the New England Congregational Church in Brooklyn, N. Y., and of the First Church in Stamford, Conn. Subsequently he passed several years in Europe, chiefly in Geneva, as student, preacher, and writer; was pastor of the Park Congregational Church in Norwich, Conn. (1878–82), and later of other Congregational and Presbyterian churches. He edited *Luther's Deutsche geistliche Lieder* (New York, 1883), and wrote *A Life Worth Living: Life of Emily Bliss Gould* (1878); *Irenics and Polemics, with Sundry Essays in Church History* (1898); *History of American Christianity* (1898); *Young People's Societies* (with C. A. Northrup, 1900), and *The Congregationalists* (1904).

**BACON,** NATHANIEL (1648–76). An English colonist, famous as the leader of "Bacon's Rebellion" in Virginia in 1676. He was the son of Thomas Bacon of Friston Hall, Suffolk, whose grandfather was cousin to the great Lord Bacon. Nathaniel Bacon was educated as a lawyer and settled in Virginia in 1673, where he obtained two valuable plantations near the present Richmond and afterward was appointed a member of the Governor's Council. His democratic ways made him extremely popular among the colonists, who chose him to lead them against the Indians, in defiance of Governor Berkeley's commands, on the outbreak of the Indian disturbance in 1675–76. He accepted the position and, by placing himself at the head of the colonists and proceeding against the Susquehannocks, brought on what is known as "Bacon's Rebellion." In the midst of his operations against the Indians he was attacked by dysentery, and died on Oct. 26, 1676, his death putting an end to the rebellion. See BACON'S REBELLION.

**BACON,** SIR NICHOLAS (1509–79). A distinguished English statesman, father of Francis Bacon. He was born at Chislehurst, graduated at Corpus Christi College, Cambridge, in 1527, and was called to the bar in 1533. He acquired a large property from confiscated monastery lands and in 1546 became Attorney to the Court of Wards and Liveries. He was in favor with Edward VI and, although a stanch Protestant, he escaped persecution under Mary and was even allowed to retain his office in the Court of Wards and Liveries. After the accession of Elizabeth he was Lord High Chancellor and Keeper of the Great Seal from 1558 to his death. As holder of this office he presided over Elizabeth's first Parliament and took a considerable part in the religious discussions preceding the Act of Supremacy. Brother-in-law of Cecil, he, in general, supported his policies, although at times he advocated a more strongly Protestant view. Sir Nicholas was one of those solid and stately Englishmen to whose sagacity, high principles, and firm demeanor his country owed its safety in that critical period when Elizabeth mounted the throne.

**BACON,** ROBERT (1860–1919). An American financier and public official. He was born in Boston and received his collegiate education at Harvard, where he graduated in 1880. Soon he became identified with prominent banking houses, first with Lee, Higginson & Co. of Boston, later as a member of the firms of E. Rollins Morse & Bro. and J. P. Morgan & Co. In 1903 he gave up active business life. Known to be a close student of foreign affairs, he was in 1905 made first assistant Secretary of State under Elihu Root, and in the beginning of 1909 succeeded to the cabinet position, upon Mr. Root's entering the Senate. He was appointed Ambassador to France by President Taft and served from 1909 to 1912. In the latter year he was made a fellow of Harvard University. He was also a member of the board of overseers of that institution from 1889 to 1908.

**BACON,** ROGER (c.1214–94). An English monk and philosopher. He was descended from a respectable family, and born at Ilchester, in Somersetshire, about 1214. Through the force of his intellect he raised himself far above his age, made remarkable discoveries in several branches of science, and contributed much to extend the then scanty knowledge of nature. The facts of his life, in the main, must be gathered from tradition and from references in various works. He studied at Oxford and then at Paris, where he received the degree of doctor of theology; and soon after his return to England he entered the order of the Franciscans and settled at Oxford. He carried on active studies and experimental researches, this latter work being done mainly in alchemy and optics. He was so far advanced in his discoveries as not only to arouse the jealousy of his associates and to create doubts as to his orthodoxy, but also to occasion his being accused of dealing in the black art of magic. In 1257, when Bonaventura was general of the Franciscan Order, Bacon was removed from Oxford, and for 10 years confined at Paris without writing materials, books, or instruments. Among those who had heard of Bacon was Guy de Foulques, the Cardinal-Bishop of Sabina, at that time (1264) papal legate in England, and later Pope Clement IV. He desired to see Bacon's writings, but the interdiction of the Franciscans prevented a compliance with his wish. On his accession to the papacy as Clement IV, Bacon wrote to him, expressing his readiness to furnish him with

whatever he desired, and Clement in reply repeated his request to see Bacon's works, despite the Franciscan prohibition. Bacon accordingly prepared his *Opus Majus*, which he sent to the Pope, it is said, by his favorite pupil, John of London, and in which he represented the necessity of a reformation in the sciences through different methods of studying the languages and nature.

The *Opus Majus* was an encyclopædia of all science, embracing grammar and logic, mathematics, physics, experimental research, and moral philosophy, many of these branches being discussed at length in other works. How Clement received these books is not known, as they could only have reached him about the time he was seized with his last illness. For 10 years after Clement's death Bacon was free from open persecution at least. But in 1278 the general of the Franciscan Order, Jerome of Ascoli (later Pope Nicholas III), declared himself against Bacon, forbade the reading of his books, and issued an order for his imprisonment, which was sanctioned by the Pope. This new imprisonment lasted 10 years, and at its conclusion Bacon returned to Oxford. He wrote a *Compendium Studii Theologiæ* (1292) and shortly after died, probably in 1294.

Bacon, although an extraordinary genius, could not rid himself of all the beliefs and errors of his times. He believed in the "philosopher's stone" and in astrology. Many inventions have been credited to him, but some of them were doubtless derived from the study of Arabian scientists. There are in his writings new and ingenious views on optics, e.g., on refraction, on the apparent magnitude of objects, on the great increase in the size of the sun and moon in the horizon. On other subjects, however, he fell into the greatest errors. He made several chemical discoveries, which were wonderful for that time. He knew, for instance, that with sulphur, saltpetre, and charcoal we may produce a substance that would imitate lightning and cause explosions—in other words, gunpowder—but its previous use by the Arabs has since been shown. Mathematics, applied to observation, he considered to be the only means of arriving at a knowledge of nature. He studied several languages and wrote Latin with great elegance and clearness. Deserving of honorable mention are his discoveries of the errors that prevailed in the calendar. He prepared a rectified calendar (1263), of which a copy is preserved in the library of University College, Oxford. On account of his extensive knowledge he received the name of "Doctor Admirabilis." Six of his works were printed between 1485 and 1614, and in 1733 S. Jebb edited the *Opus Majus*. Professor Brewer edited the *Opus Tertium*, *Opus Minus*, and *Compendium Philosophiæ*, published at London in 1859, and under the title of *Opera Inedita*. Consult Charles, *Bacon, sa vie, ses ouvrages, ses doctrines* (Paris, 1861), and the German works of Siebert (Marburg, 1861) and Held (Jena, 1881).

**BACON BEE'TLE.** A small dermestoid beetle (*Dermestes lardarius*), known also as larder-beetle, whose whitish-brown, hairy grub devours many kinds of animal substances, such as lard, ham, bacon, old cheese, horn, feathers, leather, furs, etc., and is a pest in museums of stuffed animals. The adult beetle is one-third of an inch long, dark brown with a pale-yellowish band, containing six black dots across the upper half of the wing covers. See DERMESTID BEETLES.

**BACON'GO.** An African tribe inhabiting the upper Congo valley. They are of fair stature. Their religion is a curious mixture of paganism with Christian customs, introduced by the Portuguese, their chief deity being feminine, and known as Nzambi, i.e., "all-earth mother." They have an apparently lax social organization, with an order of popular guardians of justice analogous to the secret orders of many primitive tribes. Consult Deniker, *The Races of Man* (London, 1900), and A. de Calonne Beaufaict, *Etudes Bakango* (Liége, 1912).

**BACO'NIAN CON'TROVER'SY.** See BACON, DELIA; SHAKESPEARE - BACON CONTROVERSY; DONNELLY, IGNATIUS; SHAKESPEARE, WILLIAM.

**BA'CON'S REBEL'LION.** An uprising of the Virginia colonists, particularly of the lower classes, under the leadership of Nathaniel Bacon (q.v.) against the Colonial authorities, represented by Gov. William Berkeley, in 1676. For some time before, taxes had been excessive and unfairly distributed, and Colonial commerce had been greatly hampered and restricted (see NAVIGATION ACTS, THE); the Assembly, since 1661, had been overbearing and wholly subservient to the Governor; and Governor Berkeley himself, besides showing gross favoritism, had exercised a virtual monopoly over the exceedingly profitable Indian trade. These facts combined to arouse a widespread feeling of discontent among the colonists; and this feeling was greatly intensified by the Governor's attitude toward the Indian outbreak in 1675, when he positively refused to take any effective measures to meet the threatened danger, but required, instead, that a certain number of forts be built with money to be raised by taxation. The Governor also prohibited the colonists from making any attacks on the Indians without his express orders. The Indian raids being renewed with especial violence early in 1676, and the forts proving to be altogether useless, 300 colonists assembled in disregard of the Governor's orders, and by acclamation chose Nathaniel Bacon as their leader. Though unable to procure a regular commission, Bacon accepted the position, marched against the Susquehannocks, and completely defeated them. On his return to Jamestown he was arrested, but soon afterward was released on parole. The Governor, however, gave undeniable evidence of double dealing and obstinately refused to sign Bacon's commission. Bacon thereupon marched upon Jamestown, captured it, and not only obtained a satisfactory commission as major-general, but also forced the Assembly to pass, and the Governor to approve, a set of liberal acts which became known as "Bacon's Laws," and which temporarily reformed many of the worst abuses in the colony. Bacon then undertook a second expedition against the Indians, and in the battle of Bloody Run, near the present Richmond, again completely defeated them. The Governor, meanwhile, tried to raise a force hostile to Bacon, and Bacon thereupon marched a second time against Jamestown, which he besieged, captured, and, on September 19, destroyed. On October 26, while marching to meet a hostile force under Major Brent, Bacon died in Gloucester County, of an attack of dysentery. With his death the rebellion ended. Berkeley's bloody revenge upon Bacon's followers elicited from Charles II the famous comment, "The old fool has put to death more people in that naked country than I did here for the murder of my father." The causes

of the rebellion, which is now regarded as having been a forerunner of the Revolution, were misrepresented by the authorities at the time, and were greatly misunderstood by historians until the discovery of many new documents bearing on the subject about 1890. Most of these documents have been published in the *Virginia Magazine of History* (Richmond, 1893–98). Consult an interesting and carefully written article by Edward Eggleston, entitled "Nathaniel Bacon, the Patriot of 1676," in the *Century Magazine*, vol. xl (New York, 1890), and the account in Fiske's *Old Virginia and her Neighbours* (2 vols., Boston, 1897). For Bacon's own statement see *William and Mary College Quarterly*, vol. ix, p. 7.

**BA'CONTHORPE, BA'CON,** or **BACHO,** bā'kō, JOHN (?–1346). An English schoolman and philosopher, styled *Doctor Resolutus*, or "The Resolute Doctor." He was born at Baconsthorpe (Norfolk). He entered the Carmelite Order, took his degrees as doctor of civil and canon law at the University of Paris, and from 1329 to 1333 was provincial of his order in England. He was the greatest of Carmelite scholars and also the chief expositor of the doctrines of the Arabian philosopher Averroës. He wrote more than 120 works, widely read in the Middle Ages. Of them many, including the *Commentaria super Quatuor Libros Sententiarum* (Paris, 1484), were published soon after the introduction of printing. Consult the critical works by H. Aymers (Turin, 1667–69), and Joseph Zagalia (Ferrara and Parma, 1696–1706).

**BACOOR,** bä'kō-ōr'. A town of Luzon, Philippines, in the province of Cavite. It is situated 9 miles south of Manila, on the south shore of Cavite Bay, and has a good sheltered harbor. (Map: Luzon, E 9). Pop., 1903, 10,925.

**BACSÁNYI,** bō'chän-yē, JÁNOS (1763–1845). A Hungarian patriotic poet. He was born at Tapolcza, May 11, 1763, and died at Linz, May 12, 1845. His historical work, *The Valor of the Magyars*, first brought him into notice in 1785; and the same year he was appointed clerk in the treasury at Kaschau, where he soon after helped to found a periodical called the *Magyar Museum*. Bacsányi was at this time saturated with the spirit of the French Revolution, and the liberal tendency of his poems led to the confiscation of the *Museum* in 1792. Another liberal poem soon afterward cost him his office, while his share in the so-called conspiracy of Abbot Martinovich, in 1794, resulted in two years' imprisonment in Kufstein. In prison he wrote some of his finest elegies. When the French took Vienna in 1809, he was suspected of having translated Napoleon's proclamation to the Hungarians and in consequence was forced to flee to Paris. After the Peace of Paris he was given up to the Austrian authorities, and had Linz assigned to him as a compulsory residence, but was allowed to receive his French pension until his death. Bacsányi exerted an important influence upon Hungarian literature, especially through his æsthetic writings in the *Magyar Museum* and elsewhere. He is remembered as one of the leading spirits of the "Debreczin class," which sought to weld together the best elements of the contemporary rival schools, the classical and the popular, and thus paved the way for the modern academic period. Bacsányi was made a member of the Hungarian Academy in his eightieth year. His *Works* were published by Toldy (Budapest, 1865).

**BACTE'RIA** (plur. of Neo-Lat. *bacterium*, from Gk. *βακτήριον, baktērion*, dimin. of *βάκτρον, baktron*, staff, stick). A name applied to vegetable organisms, the most minute organisms known. The name was given to the first-discovered of these bodies because of their shape, but is now used to designate this entire class of organisms. Many bacteria are not "little rods" at all, but are round or oval in shape.

The first recorded observation of the bodies we now recognize as bacteria was made about the middle of the seventeenth century by Antony van Leeuwenhoek, a Holland lens grinder, who reported his discoveries to the Royal Society of London in 1683. Continuing his investigations, Leeuwenhoek discovered the presence of bacteria in the mouth and in the intestinal evacuations; and it is interesting to note that there followed these discoveries a germ theory of disease no whit less far reaching, if less accurate, than that which exists at the present day. In 1773 O. F. Müller established two genera, *Monas* and *Vibrio*. Not much progress was made, however, until about 1838, when Ehrenberg and Dujardin included bacteria in their investigations of minute organisms. They referred the forms which they described to the animal kingdom, classifying them among the Infusoria, and placing a large number under the general title of Vibronia. Nor was this surprising. The means at the disposal of these early investigators were extremely crude. They saw these minute moving bodies and considered them animal in nature; for at that time naturalists had hardly begun to realize that animals have no monopoly of motility, though it is now a commonplace observation that the simplest plants exhibit a power of locomotion wholly lost in the higher forms. They were believed to develop spontaneously. Only after the experiments of Cohn was the doctrine of spontaneous generation as applied to bacteria overthrown, and Harvey's law, *Omne vivum ex vivo* ('All life comes from life') accepted as having universal application.

Bacteria are found almost everywhere. They are present in air, water, soil, in most foods and drink, and flourish in the mouth, stomach, and intestines, and the superficial layers of the skin. The rancidity of butter, the putrefaction of cheese, the gamy flavor and high odor of meat, the souring of milk, the mouldiness of stale bread, and many other similar conditions in food, are due to the presence of bacteria. So-called bloody stains on bread, meat, paste, etc., have also been traced to the growth of a brightly colored micro-organism. In sea water phosphorescence is caused by bacteria.

Water, even that which is usually considered pure, contains bacteria in abundance. This is true even of spring water and of water from artesian wells. Stagnant water, and the water of sewers, contain bacteria in immense numbers. The sulphurous springs of the Pyrenees are full of a bacterium (*Beggiatoa*) which accumulates sulphur in its body and is especially abundant in the scum that floats on the surface. Some bacteria, called chromogenic (color-forming) on account of the bright pigment which they produce, sometimes occur in water, and have given rise to superstitious accounts of bloody rain. The red color of stagnant pools in autumn is due to the presence of a micro-organism described by Ehrenberg as "Ophidomonas sanguinea," but now known as a species of *Spirillum*. Water serves as an excellent means for the trans-

portation of bacteria, and many of the epidemics of infectious diseases—typhoid fever, for example—are undoubtedly caused by infection of the water supply.

As already noted, bacteria were at first placed in the animal kingdom. To Cohn (1853) is due the credit of first definitely proving, on the grounds of their structure and life history, the fact that bacteria are plants. Nägeli (1857) confirmed the conclusions of Cohn, correcting certain details, and classifying bacteria not among the algæ, but as a parallel class of fungi. (See SCHIZOMYCETES.) Bacteria are divided into two groups, according as they live on dead animal or vegetable matter, or on living animal or vegetable matter. The former are termed saprophytes, the latter parasites. The great importance of this distinction will appear when it is remembered that when bacteria are living on, i.e., destroying, dead matter, they are doing good. They are decomposing dead animals and plants into their constituent elements, and returning them to the mineral kingdom again to furnish food for plant life. In this way all decay and decomposition take place. But if they live on, i.e., consume, live animals or vegetables, they are doing harm in the sense of destroying life; and it is to this group that all harmful bacteria belong. Bacteria are pathogenic or non-pathogenic, according as they produce disease or not. They are denominated aërobic when they require oxygen for growth, and anaërobic when they thrive best in the absence of oxygen.

**Classification.** Bacteria are divided, according to their shape, into three main groups: 1. *Bacilli*, or rod-shaped bacteria. These may occur singly, in pairs, or in long threads or strings, but invariably have one diameter greater than the other. 2. *Spirilli*. These are longer than bacilli, but are curved or spiral. They may appear as mere commas; or they may be long, wavy threads, or may occur as very long spirals known as Spirochetæ, or short, thick spirals called Vibrios. 3. *Micrococci*. To this group belong all spherical or nearly spherical forms. The group has many subdivisions, according to the way in which the cocci arrange themselves. They are called Streptococci when they are arranged in rows like a string of beads. When they are in bunches like grapes, they are called Staphylococci. When grouped in pairs, Diplococci; when in fours, Tetrads; when groups of 8 to 16 are arranged as cubes, they are known as Sarcinæ.

**Structure and Characteristics.** Each bacterium is a single non-nucleated cell of protoplasm surrounded by a cell membrane, and is endowed with the properties which belong to living organisms as such. Bacteria are exceedingly minute. It has been estimated that a single bacterium weighs not more than $\frac{1}{2000000000000}$ of a grain, and that 1500 of the rod-shaped forms placed end to end would about stretch across the head of an ordinary pin. Many bacteria possess distinct powers of motion, due to the possession of long, hair-like appendages or *flagella*, which project from the body of the bacterium, and with a lashing motion propel it through any liquid medium in which it may be. This motility differs greatly in degree for different species and for members of the same species under different conditions. It is confined mainly to the rod-shaped bacteria, but has been observed in a few species of micrococci. Like all living things, bacteria nourish themselves from their surrounding media, taking up external substances as food and building them up into their own cell substance, at the same time giving off waste products. Bacteria multiply by fission or division, or by spore formation. The latter consists in the formation within the bacillus of a clear round or oval body, the spore, which, when fully developed, replaces completely the bacillus. A single bacillus can form but one spore. A single spore produces but a single bacillus. Spores are much more resistant to the methods usually employed for destroying micro-organisms than are the bacilli from which they develop; and it was the failure to destroy spores that kept alive, for so long a time, the theory of spontaneous generation. When bacteria multiply by simple fission they elongate, an indentation appears near the middle, and this is followed by complete division, forming two daughter cells similar to the parent cell. The different species of bacteria preserve their identity as carefully as do the higher vegetable organisms, a given species of bacteria never producing any but the same species. This reproduction of bacteria by fission is, under favorable circumstances, exceedingly rapid—a bacterium reproducing itself in from 15 to 40 minutes. This would, in 24 hours, result in the production of many millions of bacteria from a single individual.

Drying kills many species of bacteria; others simply remain inactive. Cold destroys many bacteria, though some are not killed by low temperatures. The typhoid bacillus can exist for many months frozen in a cake of ice, to become active and dangerous again when the ice is melted and used. Heat, especially moist heat, above a certain point, kills all bacteria; the application of heat to the destruction of bacteria is known as sterilization. Thus, boiling milk or water, or cooking meats or vegetables, destroys any bacteria that may have been present. The same applies to surgical dressings, such dressings being spoken of as sterile, or, because of the absence of infectious material, as aseptic. Certain chemical substances known as germicides, disinfectants, etc., are very inimical to bacteria, e.g., solutions of mercuric chloride, of carbolic acid, etc., and surgical dressings in which such chemicals are used are known as antiseptic dressings.

It is because of the relation of bacteria to certain diseases that these organisms have come to occupy so much general public attention. The parasitic bacteria, in contradistinction to the saprophytic, live upon and destroy living organisms. The disease-producing bacteria are known as pathogenic. Many infectious diseases are positively known to be caused by bacteria, and it is believed that all other infectious diseases are so caused, although the specific germs of measles, scarlet fever, and other diseases remain undiscovered, probably because they are ultramicroscopic. The effects of disease-producing bacteria upon the body tissues may be grouped in three classes: 1. Effects due to the direct local action of the bacteria on the tissues, as the membrane in diphtheria. 2. Mechanical effects, as when a clump of bacteria get into a blood vessel and block it (infectious embolus). 3. Effects due to the production in the body, under the influence of the bacteria, of certain chemical substances which act as poisons to the tissues. These poisons are in solution in

the body fluids, and each is peculiar to the species of bacteria which produces it; e.g., the poison, or toxin, as it is called, of diphtheria is different from the toxin of typhoid fever.

The question presents itself as to why, when bacteria once start to grow on such a good culture medium as the body, do they ever stop growing; or, in other words, why does one ever recover from an infectious disease? Our present belief is that there is produced in the body, as the result of the action of the bacteria, not only a toxin, but another chemical substance, which is antagonistic to the proliferation of the bacteria, and which is known as antitoxin. To the persistence in the body of this antitoxin is ascribed the immunity which a person who has had an infectious disease often has from that disease. Upon this principle is based the well-known diphtheria antitoxin. A fresh culture in bouillon of the diphtheria bacillus is allowed to stand until toxins are formed in the bouillon. It is then strained through a Pasteur filter, and a small amount is introduced into the body of a horse Some days later a larger dose is given, and then constantly increasing quantities are injected during some months. The animal is thus rendered immune to the action of the toxin, and the fluid part, or serum, of its blood is the antitoxin now so successfully used in the treatment of diphtheria. See DIPHTHERIA; ANTITOXIN; TOXIN.

Bacteria may be grown artificially on various substances which furnish them suitable food. These are known as culture media. Among the more common of these are bouillon and potato. In order to make a medium which is solid at ordinary temperatures, but which may be liquefied by slight heating, gelatin or agar-agar is often added to the bouillon. Thus, if a drop of fluid containing bacteria which we wish to study be added to warm melted gelatin or agar-agar bouillon, the latter may be poured out in a thin layer on a cold plate, where it immediately hardens, thus fixing the bacteria and preventing their moving about in the medium. If the dilution be sufficient to separate the bacteria well, as growth occurs, minute specks are seen dotting the surface of the plate. These are called colonies, and each such colony consists of a single species of bacteria. By taking a bit from one of these spots or colonies and transferring it to some other sterile medium, there results a growth which is free from all life other than the single species of bacteria. This is known as a "pure culture." Many different species of bacteria so closely resemble one another in appearance that they cannot be differentiated by the microscope. Each species has, however, certain peculiarities of growth and development. Thus recourse is often had to cultivation upon different media, where their life histories may be studied and the identity of a particular species determined. For the very careful study of bacteria many different modifications of the culture media have been devised. The medium is sometimes colored by litmus, to show any reaction the growth of the bacteria may produce. Sugar is sometimes added to the medium, which is then placed in a crooked tube closed at one end, so that if the species causes fermentation it may be noted by the collecting of gas at the closed end of the tube. All media are sterilized before using, to destroy any bacteria that may be present. After inoculation the media are kept at room temperature, or more often are placed in an incubator at about blood heat.

For microscopical study, bacteria may be simply placed under a thin glass cover upon a glass slide. They may be studied unstained, but are more often stained in various ways, to render them more distinct or to bring out certain peculiarities. Some of the bacteria, e.g., the tubercle bacillus (see TUBERCULOSIS), depend for their recognition very largely upon their specific reaction to certain stains and can be differentiated only in this way. They are usually studied with an oil-immersion lens of not less than 1000 diameter magnification. See ABSCESS. For history and bibliography, see DISEASE, GERM THEORY OF.

**BAC'TRIA.** The name given in ancient times to a province or country in Central Asia extending northward from the Hindu-Kush Mountains as far as the river Oxus (Amu or Jihon), and called also Bactriana by classical writers. The exact extent of this land in early times cannot now be determined, but it must have been considerable; and, although barren to the north, its southern regions were rich in pasture lands, which made Bactria famous in antiquity, among other things, for its fine breed of horses. In history it has been the seat of a number of powerful rulers, who are best known as the successors of Alexander the Great in the East. What was formerly Bactria is now included in parts of Afghanistan and Asiatic Russia.

The name of the province or country appears in the Old Persian Inscriptions (Bh. i. 16; Dar. Pers. e. 16; NR. a. 23) as *Bāxtri*, i.e., Bakhtri. It is written in the Avesta *Bāxδi*. From this latter came the intermediate form *Bāxli*, Sanskrit *Bahlīka*, *Balhika*, 'Bactrian,' Armen. *Bahl*, and by transposition, the Mod. Pers. *Balx*, i.e., Balkh. The capital city, Balkh, or earlier Bactra, was situated on the Dargidus or Bactrus (now Dehas). This city seems also to be known in the classics as Zariaspa. In the Avesta (Vendīdād 1.7), and elsewhere, it receives the title "beautiful" (Av. *srīra*), to which the attribute "with banners on high" is appended. This additional designation of the capital of Bactria in ancient times was apparently due to the custom, mentioned by Masudi and Yakut, of pious pilgrims hanging green silk banners from the walls of the temple Naubehar. This latter name has been supposed to refer to a Buddhist "New Cloister" (*nava-vihāra*), as we know that Balkh, in the province of Bactria, was a flourishing seat of Buddhism in the early Christian centuries.

Bactria is supposed to have been originally the centre of a powerful kingdom founded more than 1000 years before the Christian Era and exercising extensive sway throughout Iran. The strongest support for the existence of such a kingdom, antedating the Median rule and the Achæmenian sovereignty of the Persian Empire, will be found in Duncker, *Geschichte des Altertums* (Leipzig, 1878–86). One of the principal arguments brought forward in favor of such a view is the story of the campaign of Ninus of Assyria against a Bactrian king, Zoroaster, as mentioned by Ctesias, and recounted with some variations by Trogus Pompeius (in Justin), Eusebius, and others. The record seems to contain some allusion to Zoroaster, the Prophet of ancient Iran, whose patron was Vishtaspa, and whose death occurred at Balkh, according to Firdausi and others, when the city was stormed

by the Turanians. For this and similar reasons Bactria is often regarded as the cradle of the ancient Magian religion. (See ZOROASTER.) The bearing of all these passages in their historic light is discussed in Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1899). But considerable doubt is attached to the antiquity of the story of Zoroaster's death at Balkh; and so high an authority on Persian history as Justi disclaims the existence of a Bactrian kingdom before the time of Alexander the Great. Yet others may hold a different opinion. However the case may be, there is no doubt that Cyrus subjugated Bactria and made it a Persian province; and Darius in his inscriptions includes Bactria as one of the countries tributary to the Achæmenian power. Herodotus enumerates the forces which Bactria contributed to the Persian invasion of Greece.

From the time of Alexander the history of Bactria becomes clearer and may be followed with more detail. When he conquered the rest of Iran, Bactria likewise fell before his power, and he made Roxana, daughter of the Bactrian ruler Oxyartes, his wife, 327 B.C. On leaving Persia he assigned a strong force of Greeks to occupy Bactria, and it thus became part of the kingdom of the Seleucidæ. About 256 B.C., with the revolt of the satrap Diodotus I, a new Græco-Bactrian kingdom was established, whose power ultimately extended as far as northern India, although in Iran it had to give place to the Parthian sway. The history of this later Græco-Bactrian kingdom has been cleared up in large measure by means of the coins and other antiquities which have been discovered in recent times, especially in Afghanistan. The Greek and later the Prakit devices and inscriptions on these coins give a series of royal names whose succession has been fixed with comparative accuracy.

The inhabitants of ancient Bactria (modern *Balkh*) were closely related to the Persians and shared in, if they did not produce, the old Aryan culture of this region from which sprang Zoroastrianism, the Indo-Bactrian alphabet, etc. It was in this part of the world that ethnologists formerly sought the primitive home of the Aryan stock, but that assumption is now largely abandoned. Nevertheless an early presence of Aryan peoples here is undoubted, and their influence went both east and west. Of recent literature, reference may be made to Biddulph's *Tribes of the Hindoo-Koosh* (London, 1881) and Geiger's *Die Pamir-Gebiete* (Vienna, 1887), besides the numerous studies of Ujfalvy on the Aryans of these regions, contained especially in his *Expédition scientifique française en Russie, en Sibérie, et dans le Turkestan* (Paris, 1878–80) and *Aus dem westlichen Himalaja* (Leipzig, 1884). For references of classical historians and authors, consult McCrindle, *Ancient India as described by Classical Authors* (5 vols., London, 1896). On the general question of the Bactrian kingdom, consult: F. Justi, in Geiger and Kuhn, *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1896–1904); Gutschmid, *Geschichte Irans* (Strassburg, 1887); Wilson, *Ariana Antiqua* (London, 1841); and especially Rawlinson, *Bactria, the History of a Forgotten Empire* (London, 1912); V. A. Smith, *The Early History of India* (Oxford, 1904), deals briefly but thoroughly with the general aspects of its history. On the coins, consult Percy Gardner, *The Coins of the Greek and Scythic Kings of Bactria and India* (London, 1886), and E. Thomas, "Bactrian Coins," in *Journal of the Royal Asiatic Society* (London, 1873). For Indo-Greek art and Greek influence on India, consult Tarn, "Notes on Hellenism in Bactria and India," in the *Journal of Hellenic Studies* (1902), and Havell, *Indian Sculpture and Painting* (London, 1908).

**BAC'TRIAN CAM'EL.** See CAMEL.

**BACTRIAN SAGE, THE.** A title of Zoroaster, the Persian religious teacher, who was a native of the hills of the upper Oxus. See ZOROASTER.

**BAC'TRIS** (Gk. *βάκτρον, baktron*, staff). A genus of palms, of which 90 species are known, all of which are tropical American. The leaves of some are pinnate, those of others entire. They are generally small palms, some of them very small and with slender stems, those of *Bactris tenuis* being no thicker than a goose quill. Some are spiny and form thickets not easily traversed. *Bactris acanthocarpa* yields a thread that is exceedingly tough and is used for making nets. The maraja (*Bactris maraja*) palm produces large clusters of fruit, resembling small grapes, with a thin pulp of an agreeable subacid flavor. The stems of this species are used for walking sticks.

**BACTRITES,** băk-trī'tēz (Gk. *βάκτρον, baktron*, staff, stick, in allusion to its straight form similar to that of Baculites). A genus of fossil cephalopods of the order Ammonoidea, and the only member of the family Bactritidæ. The shells are straight, very slender, and gently tapering, with a round or elliptical section. The siphuncle is situated near the ventral wall and is very delicate. The suture is a simple curve with a small ventral angular lobe over the siphuncle, and, in some species of elliptical section, an incipient lateral lobe. The protoconch or embryonic shell is egg-shaped and erect, and has no scar such as is found on the initial chamber of the nautilus. Bactrites is of more than ordinary interest, because it seems to furnish one of those rare examples of a connecting link between two well-differentiated orders of animals, viz., the Nautiloidea and the Ammonoidea. The general form of the shell is that of *Orthoceras*, and the straight cone of *Bactrites* is a primitive character, as it is in *Orthoceras*, and not to be compared with the degraded uncoiled shells (*Baculites*) that are evolved in the senile (phylogerontic) stages of several Jurassic and Cretaceous races of Ammonoidea. The shape and position of the protoconch are very similar to that of *Mimoceras* (*Goniatites*) *compressum*, which shell is uncoiled in its early embryonic stages, but becomes closely wound in its adolescent stages. Moreover, one of the Nautiloidea, the genus *Protobactrites*, seems to afford an indication of the stock from which *Bactrites* itself was derived.

The genus *Bactrites* contains about 15 species that range through all the formations from the Ordovician to the Trias, inclusive, with the exception of the Silurian, in which latter no members of the group have yet been found. See CEPHALOPODA.

**BACULARD D'ARNAUD,** bȧ'kụ'lär' där'nō', FRANÇOIS. See ARNAUD, FRANÇOIS THOMAS DE BACULARD D'.

**BACULITES,** băk'ū-lī'tēz (Lat. *baculum*, staff, stick, in reference to its straight form). A genus of fossil cephalopods of the order Ammonoidea, family Macroscaphitidæ. The shells are

usually found as segments of an elongated cone that tapers gently and has an elliptical or ovate cross-section. The suture line is quite complex and indicates that these shells belong to an advanced race of ammonoids. In perfect specimens preserving the protoconch, the embryonic shell is seen to be closely coiled for several turns and then to branch off on a tangent to the coil and maintain a straight condition throughout the remainder of its life. Several other genera included in the same family show similar aberrant phylogerontic forms that have all been derived from the normally coiled shells of earlier types. The genus *Baculites* contains about 30 species, all of which are found in rocks of the Cretaceous Age in both Europe and America. At one locality in France these shells are so abundant as to cause the name of "Baculite limestone" to be given to the rock containing them. Very fine specimens, often of great size —4 feet in length—have been found in the Black Hills of Dakota and Wyoming, and here have also been obtained specimens on which the mother-of-pearl presents more beautiful coloring than is to be found on any shells now living in the ocean. For illustration, see CEPHALOPODA, Plate II, Fig. 7. See CEPHALOPODA; CRETACEOUS SYSTEM.

**BACUP,** bāk'ŭp. A manufacturing town of Lancashire, England, on the Lancashire and Yorkshire Railway, 22 miles north of Manchester (Map: England, D 3). The town was incorporated in 1882, and since that time great improvements have been made in its condition and appearance. Bacup owns its water works, maintains public markets, parks, baths, and cemeteries, and has fine playgrounds. It also has a sewage farm for the utilization of the town refuse. There is a mechanics' institute and library. Bacup has extensive cotton and woolen factories, brass and iron foundries; and there are numerous coal mines in the neighborhood. Coöperative stores on a large scale are maintained. Pop., 1891, 23,498; 1901, 22,505; 1911, 22,318.

**BADAGAS,** bä-dä'gäz. One of the Dravidian tribes of the Nilgiri Hills in southern India (numbering, in 1891, 29,613), somewhat shorter, darker-skinned, and longer-headed than the Todas, and probably less mixed with Aryan blood. They are not a disappearing people, but, aided by the policy of the Indian government, hold their own, though burdened by the caste system. Their name is said to signify 'northerners,' which indicates comparatively recent migration. They are monogamous and have some curious marriage customs. (See DRAVIDIANS.) Of recent literature since Shortt's "Tribes of the Neilgherries," in the *Transactions of the Ethnological Society of London* for 1869, may be mentioned: Breeks, *An Account of the Primitive Tribes and Monuments of the Nilagiris* (London, 1873); Reclus, *Primitive Folk* (Eng. trans., New York, 1891); and Oppert, *On the Original Inhabitants of Bharatavarsa, India* (Eng. trans., London, 1894).

**BADAGRY,** bä'dä-grē'. A seaport of Southern Nigeria, British West Africa, situated west of Lagos, with which it is connected by lagoons. It was formerly the capital of a negro kingdom, and during the Portuguese occupation was an important slave-trading centre, with a population of 10,000. Since then it has diminished in importance and in population.

**BADAJOZ,** bä'dä-hōs', *Sp. pron.* bä'dä-hōth' (anciently, Lat. *Pax Augusta*, 'Peace of Augustus' or *Batallium*, which the Moors turned into *Bax Augos, Bathaljus, Badaljoz*, whence *Badajoz*). Seat of a bishopric, capital of the Spanish province of the same name (Map: Spain, B 3), and official residence of the captain-general of Estremadura. It is situated about 5 miles from the borders of Portugal, in a fertile district, on the left bank of the Guadiana, which is here crossed by a granite bridge of 32 arches. It is strongly fortified and has a military hospital, an arsenal, and the old cathedral of San Juan, built about the middle of the thirteenth century, with a splendid organ, and paintings by Mateo, Cerezo, and Morales. The last named was born at Badajoz. Considerable trade is carried on with Portugal, and there are manufactures of soap, coarse woolens, leather, hats, and pottery. Pop., 1900, 30,899; 1910, 35,039. As one of the keys of Portugal, Badajoz has often been a place of importance in war. It was besieged in vain by the Portuguese in 1660, and again by the Allies in the War of the Spanish Succession in 1705. During the Peninsular War Badajoz was besieged by the French in 1808 and in 1809, and again in 1811, when it surrendered, March 11, to Soult. Several attempts to regain it were made by the British under Marshal Beresford and Lord Wellington, the latter of whom finally took it by storm, April 6, 1812.

**BADAKHSHAN,** bä'dȧĸ-shän' (Pers., Hind. *bad*, region, district + *Oxus*, river) (Map: Afghanistan, M 3). A district of northeastern Afghanistan, lying directly north of Cabul, on the edge of the Tamir Plateau. The Amu Darya or Oxus River flows along its northwestern border. The capital is Faizabad. It is a region of great fertility and is rich in metals—iron, copper, and silver principally, as well as lapis lazuli and rubies. The inhabitants are in great part Tajiks, a Persian-speaking Aryan race. They are Mohammedans—Shiites in the mountains and Sunnites in the plains. The population is estimated at from 100,000 to 150,000. They are largely a pastoral people, raising goats, camels, and a breed of small fiery horses. After the trade in metals and precious stones, however, the slave trade is of next importance. The people of Badakhshan seem to have been always under the immediate rule of their own chiefs, at the head of whom was the Ameer. They have generally, however, formed part of some great empire. In the eighteenth century Badakhshan constituted a part of the empire of Nadir Shah, after whose death it became subject to the Afghans. After many revolts and changes it was confirmed to Afghanistan by the Anglo-Russian agreement of 1873. Consult Yule, *Marco Polo* (London, 1871), and Vambéry, *Central Asia* (London, 1874).

**BADALONA,** bä'dä-lō'nȧ (*Baetulo, Betulo* of the Romans). A seaport town of Spain, in the province of Barcelona, 5 miles by rail northeast of the city of Barcelona, of which it is a suburb (Map: Spain, G 2). It is situated in a fertile region which produces grain, oranges, and a great variety of vegetables. The town has experienced rapid industrial growth and manufactures wine. There are, besides, shipyards, sugar and petroleum refineries, and glass works, the latter the largest in Spain. A considerable coastwise trade is carried on. Pop., 1887, 15,974; 1900, 19,240; 1910, 20,957.

**BADDECK'** (from the Fr. *Bedeque* for Ind-

*Ebĕdĕk*). A seaport and favorite summer resort on Cape Breton Island and Lake Bras d'Or. It is the capital of Victoria Co., Nova Scotia, Canada (Map: Nova Scotia, J 2). It is celebrated by Charles Dudley Warner in *Baddeck, and That Sort of Thing* (Boston, 1874). Pop., 1901, 1235; 1911, 1650.

**BADEAU**, bȧ-dō', ADAM (1831–95). An American soldier and author. He was born in New York City, was educated in Tarrytown, N. Y., and in 1862 entered the Federal army as an aid to Gen. T. W. Sherman. In May, 1863, he was severely wounded while leading an assault on Port Hudson, and in March, 1864, became military secretary to General Grant, on whose staff he served until 1869, when he retired from the service with the regular rank of colonel and the brevet rank of brigadier general. He was afterward Secretary of Legation in London (1869), Consul General there from 1870 to 1881, and Consul General at Havana from 1882 to 1884. In 1877 and 1878 he accompanied General Grant on a portion of his tour around the world. In 1882–84 he was Consul General at Havana, but in the latter year he resigned because of differences with the administration. He published a collection of essays entitled *The Vagabond* (1859); *A Military History of Ulysses S. Grant* (3 vols.; new ed., 1885); *Conspiracy: A Cuban Romance* (1885); *Aristocracy in England* (1886); *Grant in Peace* (1886).

**BADEBEC**, bȧd'bĕk'. In Rabelais's *Pantagruel*, the wife of Gargantua and mother of Pantagruel. She died at his birth, after bringing forth at the same time 900 dromedaries, 7 camels, and a number of wagons, all laden with provisions.

**BAD EMS.** See EMS.

**BADEN**, bä'den. A grand duchy of the German Empire, the fourth state in size and the fifth in population, situated at the southwestern end of the empire (Map: Germany, C 4). It covers an area of 5823 square miles, exclusive of its share of Lake Constance (65 square miles). Its boundaries are formed by the Rhine on the west and the south, which separates it from the Rhine-Palatinate, Alsace, and Switzerland; Württemberg and Hohenzollern on the east; and Bavaria and Hesse on the north.

**Surface and Hydrography.** About 84 per cent of the total area is a part of the south German mountain and hill lands. The remainder belongs to the plain of the upper Rhine. The chief mountain system is the Schwarzwald (see BLACK FOREST), a narrow range of wooded mountains extending from Basel in a northeasterly direction for about 100 miles along the Rhine valley. It terminates at Pforzheim, descending gradually into the plateau of the Neckar in Württemberg. The highest peaks, as the Feldberg (4900 feet) and Belchen (4600 feet), are found in the upper or southern part of the Schwarzwald, which has a mean altitude of 3170 feet. The Odenwald Range, situated at the northern end of the grand duchy, has a mean altitude of about 1500 feet. One of the most remarkable mountain groups is the Kaiserstuhl, or 'Emperor's seat,' situated between Breisach and Endingen. Its base is about 23 miles in circumference, and its highest summit reaches an altitude of over 1800 feet.

Baden is drained by the Rhine, which receives the Neckar and smaller streams, and by the Danube, which takes its rise in the Schwarzwald. There are several mountain lakes in Baden, some of them situated at a great altitude; and a part of Lake Constance is also included in it.

The climate of Baden is, on the whole, very warm, but its temperature varies considerably on account of its uneven surface. The average yearly temperature is about 51° F. in the plains and 44° in the highlands.

**Agriculture and Forestry.** In spite of its mountainous surface Baden is one of the most productive parts of Germany. Abundantly watered and well cultivated, its soil has been brought to a high state of productivity, not only in the valleys, but also in the hilly regions. Of the total area, in 1900, 568,600 hectares (37.7 per cent) were in cultivated field and garden; 209,600 hectares (13.9 per cent), meadow; 54,700 hectares (3.6 per cent), pasture; 20,000 hectares (1.3 per cent), vineyard; 567,800 hectares (37.7 per cent), forest; 87,400 hectares (5.8 per cent), roads, yards, water, etc. The harvest of 1912 included 77,476 metric tons of rye, 80,723 wheat, 89,029 spelt, 98,409 summer barley, 111,070 oats, 1,030,364 potatoes, and 1,193,440 hay. Tobacco is an important product; in 1911, from a total of 7211 hectares there was a yield of 13,221,829 kilos of leaves, valued at 8,089,616 marks. Though the area in vineyards shows a decreasing tendency, wine continues a staple product; the Baden brands are among the best in Germany. The centre of viticulture is the circle of Freiburg. From a total productive area of 15,084 hectares in 1912, there was a yield of 123,274 hectoliters of must, valued at 6,200,000 marks. This output showed a great decline as compared with that of 1911, when from 15,604 hectares there were produced 364,914 hectoliters of must, valued at 21,700,000 marks. The extensive forests of Baden are exploited on a large scale. The Schwarzwald region yields the best timber for shipbuilding, which finds its way chiefly to Holland. The annual output of timber is valued at 20,000,000 marks, of which fully one-third is exported. Cattle raising is also an important and progressive industry. Live stock (December, 1912): horses, 74,000; cattle, 649,000; sheep, 40,000; swine, 476,000; goats, 135,000; fowls, 2,556,000.

The mineral production is comparatively unimportant; the chief products are salt and building stone.

**Manufacturing and Commerce.** Since its incorporation with the customs union of Germany in 1835 Baden's industrial conditions have undergone a rapid extension. During the period 1882–95 the number of people engaged in manufacturing increased from 204,542 to 287,450. The manufacturing industries are centred chiefly in the two circles of Karlsruhe and Mannheim. Foremost among them are the cotton and silk mills and to a lesser extent the woolen and linen mills. There are also extensive manufactures of jewelry, mirrors, machinery, leather, paper, cigars, and woodenware. Baden also contains one of the largest sugar mills in Germany and several large chemical factories. Watch making is an important industry in the Schwarzwald region, employing over 11,000 people. Baden is well fitted for commerce by its extensive waterways and by its railways. The latter in 1911 had a length of 2351 kilometers (1461 miles); broad-gauge railways aggregated 2048 kilometers (235 private); narrow-gauge, 303 kilometers (276 private). Mannheim is the chief commercial centre of Baden and one of the busiest ports on the upper Rhine.

**Government.** The constitution of Baden dates from Aug. 22, 1818, and was modified Aug. 24, 1904. Baden entered the North German Confederation for the founding of the German Empire by treaty of Nov. 15, 1870. The executive power is vested in the grand duke, who inherits as the eldest son of the male line (or, if that fails, of the female line). The legislative power rests with the grand duke and a parliament (Landtag); the parliament consists of two chambers, which convene every two years. The Upper Chamber is composed of the princes (of full age) of the grand-ducal house, the heads of the seigniorial families, 8 members elected for eight years by the landed nobility, the Archbishop of Freiburg and the Protestant prelate, 2 representatives of the state universities and one representative of the technical high school, 8 members appointed by the grand duke regardless of rank or birth; and some others. The Lower Chamber is composed of 73 members, 24 from 13 towns and 49 from rural districts. The members of the Lower Chamber are elected by direct popular vote for a period of 4 years, half of the members retiring every 2 years. Every male citizen 25 years old or over has the right to vote, and every male citizen after reaching the age of 30 is eligible to office. Baden is represented by 3 members in the Bundesrat and 14 deputies in the Reichstag of the Empire. For purposes of administration it is divided into 11 circles. The Council of State is divided into the four ministries of the interior (including commerce, industry, and agriculture); foreign affairs and justice; finance; and worship and instruction. The capital is Karlsruhe, with a population in 1910 of 134,313.

Every citizen has the guarantee of religious freedom, and the several religious denominations receive state aid. In military affairs Baden is under the control of the Imperial government, and its military contingent constitutes almost the entire Fourteenth Army Corps.

The revenue is derived mainly from direct and indirect taxes, domains, railways, and customs. The budget for 1911 balanced at 105,179,459 marks: for 1912, 105,146,683 marks. The railway debt of Baden (the only indebtedness of the grand duchy) amounted at the beginning of 1912 to 542,864,491 marks.

**Public Instruction.** The institutions for higher education, viz., the two universities of Heidelberg and Freiburg, as well as the technical and the art school of Karlsruhe, are under the supervision of the minister of worship and instruction. In 1912 the universities had 6227 students, and the technical school 1375. The secondary and elementary schools are under the control of the board of education and the different local boards and commissioners. The public elementary schools (there are very few private ones) in 1911 numbered 1659, with 5625 teachers and 335,264 pupils. The schools for secondary education number about 100, excluding the numerous trade schools, seminaries, teachers' institutes, etc.

**Population.** The population of Baden at the census of Dec. 31, 1910, was 2,142,833. In 1816 the grand duchy had 1,006,000 inhabitants; in 1864, 1,432,000; in 1871, 1,461,562; in 1880, 1,570,254; in 1890, 1,657,867; in 1900, 1,867,944. The average annual increase from 1816 to 1864 was 0.74 per cent; from 1864 to 1910, 0.88 per cent; from 1900 to 1910, 1.37 per cent. Of the total population at the 1910 census, Roman Catholics numbered 1,271,015 (59.32 per cent); evangelical Christians, 826,364 (38.56 per cent); other Christians, 13,229 (0.62 per cent); Jews, 25,896 (1.21 per cent). The population is very homogeneous, nearly 99 per cent being German (including 91 per cent natives of Baden) and only 1 per cent foreign. A comparison of the two industrial censuses of 1895 and 1882 reveals clearly the tendency in the economic development of the country. The proportion of the population engaged in agriculture shows a decrease for 1882–95 of 7 per cent; while the proportion engaged in manufacturing and other industries shows an increase of 3 per cent for the same period, with a corresponding increase in the number engaged in commerce and transportation and in persons without occupation.

**History.** The original inhabitants of Baden were the Alemanni. They were conquered by the Franks under Clovis in 496 and were Christianized. They made repeated attempts to regain their independence, but in vain; and the dukedom of the Alemanni was abolished in 748 by Pepin the Short. In the eleventh century Duke Berthold, a supposed descendant of the Alemannian Gottfried, built the castle of Zähringen in Breisgau, and with him begins the unbroken line of the princes of the house of Zähringen. Berthold's second son, Hermann, took the title of Margrave of Baden and became the founder of the still flourishing house of Baden. He died in 1074. The history of this house presents for several generations little else but a succession of partitions of the territories among brothers, to be again and again reunited upon one or other of the collateral branches becoming extinct. The prosperity of the country was thus greatly retarded. From the time of the Reformation there existed two lines, those of Baden-Baden and Baden-Durlach, which were united in 1771. The present capital, Karlsruhe, was built in 1715 by the Margrave of Baden-Durlach, Charles William. His grandson, Charles Frederick, favored the policy of Napoleon and joined the Confederation of the Rhine. By this move he doubled his possessions in extent and population and acquired successively the titles of Elector and Grand Duke. In 1811 he was succeeded by his grandson, Charles Louis Frederick, who, five years before, had married Stephanie, an adopted daughter of Napoleon. After the battle of Leipzig this prince seceded from the Confederation of the Rhine and (1815) joined the German Confederation.

In 1818 the Grand Duke Charles granted the charter which forms the basis of the present constitution. He was succeeded in the same year by his uncle, Louis, who was inclined to absolutism and had to contend at first with a powerful opposition. He succeeded, in 1825, in carrying through an alteration of the constitution, extending the duration of the diets, after which the government and the chambers acted more harmoniously. Louis died childless (1830) and was succeeded by his half-brother, Leopold. The known liberal tendencies of this prince promised at first a new life to constitutional government; but the tide of reaction, which became strong after the failure of the Polish insurrection and the fall of Warsaw in 1831, soon seized upon the government, and the act establishing the freedom of the press, which had been passed in 1831, was in 1832 declared abrogated. A fluctuating contest between a reactionary government and a growing opposition was carried on till 1846,

when the Constitutionalist Bekk was made Minister of the Interior, and liberalism thus placed at the helm. The first effect was to calm the public mind and to cause a split between the Liberals and the Radicals. The ninth Parliament met (December, 1847) under the most friendly and promising auspices, but the French Revolution of February, 1848, suddenly aroused the Radical party to the most violent activity. Not satisfied with a multitude of liberal measures passed by the Legislature, the revolutionary leaders, Hecker and Struve, aimed at establishing a republic, and stirred up an insurrection. The army sided with the insurgents, the Grand Duke fled, and a constituent assembly was called. The Grand Duke had recourse to Prussian aid, and after several battles was reinstated on his throne. Upon the whole, the reactionary tendency was less marked in Baden than in most other German states. In 1859 a conflict between the authorities of the state and the Roman Catholic hierarchy ended in favor of the latter; in 1861 the complete independence of the Catholic church was recognized by a definite settlement, and a like privilege was extended to the Protestant church of Baden. In the war between Prussia and Austria, in 1866, Baden lent aid to the latter, and on the declaration of peace was obliged to pay a heavy indemnity and to reorganize her army on the Prussian model. In 1867 Baden entered the North-German Confederation. In 1870–71 the troops of Baden fought with distinction in the Franco-German War, and the grand duchy became a part of the new-born German Empire. The present Grand Duke is Frederic II, who succeeded to the throne Sept. 28, 1907. See GERMANY.

Consult: *Das Grossherzogthum Baden in geographischer, naturwissenschaftlicher, etc., Hinsicht dargestellt* (Karlsruhe, 1885); Weech, *Badische Geschichte* (Karlsruhe, 1890); *Regesten der Markgrafen von Baden und Hochberg* (Innsbrück, 1892); Meyer, *Badisches Volksleben im 19 Jahrhundert* (Strassburg, 1900).

**BADEN** (Ger. baths). A watering place in the canton of Aargau, Switzerland, on the Limmat, 1260 feet above the sea, 13 miles northwest of Zürich (Map: Switzerland, C 1). It was known to the Romans as *Thermæ Helveticæ* and under the Hapsburgs was a stronghold of importance. Its waters are considered beneficial for gout, rheumatism, and diseases of the throat and lungs. Pop., 1900, 6100; 1910, 8318.

**BADEN,** or **BADEN BEI WIEN** (Ger. baths near Vienna). A watering place of Lower Austria, beautifully situated on the Schwechat, about 17 miles by rail southwest of Vienna (Map: Austria, E 2). Its warm sulphur springs, 13 in number, vary in temperature from 72° to 97° F. The town has the usual accessories of a fashionable watering resort—large bathing establishments, cursaal, trinkhalle, summer theatre, etc. In the neighborhood are numerous villas belonging to the Austrian nobility, and some interesting ruins. Baden was known in the time of Marcus Aurelius as *Thermæ Pannonicæ* (*Pannonian Springs*). It was made a city in 1840. About 4 miles from Baden is Meierling, a royal hunting lodge (now a convent), where Crown Prince Rudolph of Austria met his tragic death in 1889. Visitors number from 18,000 to 25,000 annually. Pop., 1890, 15,800; 1900, 17,700; 1910, 19,073.

**BADEN,** or **BADEN-BADEN.** A town and fashionable health resort of the grand duchy of Baden, about 20 miles southwest of Karlsruhe, situated in the pleasant valley of the Oos River, at the edge of the Black Forest (Map: Germany, C 4). It is chiefly celebrated for its hot saline springs, which were famous in the time of the Romans. They range in temperature from 115° to 153° F., and are recommended for the treatment of rheumatism, gout, and diseases of the kidneys and skin. Among the chief buildings and objects of interest in Baden and its vicinity are the ruins of the old castle, once the residence of the margraves of Baden; and the new castle, the summer residence of the Grand Duke since 1842; the Pfarrkirche; the Anglican and Greek churches; the trinkhalle, museum, luxurious bathing establishments, and the nunnery of Lichtenthal, founded in 1245. The principal industry is wood carving. The town Baden was known to the Romans as Civitas Aurelia Aquensis ('watering place of Aurelius'). It was burned by the French in 1689. Pop., 1895, 14,862; 1900, 15,700; 1910, 22,066. At the height of the season the influx of visitors quintuples the number of the resident population.

**BADENI,** bä-dĕn'yĕ, CASIMIR FELIX, COUNT (1846–1909). An Austrian statesman, born at Surochów, Galicia. After the completion of his academic education he studied law at Cracow and early entered political life. He rose rapidly into prominence, becoming in 1888 Governor of Galicia and seven years later Premier of the Austro-Hungarian Empire. The most notable event of his administration was the promulgation of the Ordinance of Languages for Bohemia and Moravia, a measure by which Badeni endeavored to place the Czech language on an equal footing with the German in the two provinces named. Disorderly scenes of obstruction occurred in the Austro-Hungarian Parliament, as the Germanic element bitterly opposed the bill, and finally, in 1897, the premier was forced to resign. From that time until his death he took no active part in politics.

**BADEN-POWELL,** bā'dĕn-pō'ĕl, SIR GEORGE SMYTH (1847–98). An English politician and author, born at Oxford. He graduated at Balliol College, Oxford, in 1875; in 1877 was appointed private secretary to the Governor of Victoria, and in 1885 was returned to Parliament as a Conservative for the Kirkdale Division of Liverpool. In 1886 he established a new steamship line running from Vancouver to Yokohama; in 1886–87 and 1891 investigated the dispute between Canada and the United States concerning the Bering Sea fisheries, and in 1893 was expert agent for the government in the conduct of the British case before the tribunal at Paris. He published *Protection and Bad Times* (1879); *State Aid and State Interference* (1882), also in protest against protection; and an anti-Home Rule work, *The Saving of Ireland, Industrial, Financial, Political* (1898).

**BADEN-POWELL,** SIR ROBERT STEPHENSON SMYTH (1857– ). A British general. He entered the army in 1876, and served in India, Afghanistan, and South Africa, where he became assistant military secretary (1887–89) and occupied the same position at Malta (1890–93). He afterward served with distinction in Ashanti, as commander of the native levies (1895), and in the Matabele campaign. In 1897 he became colonel of the Fifth Dragoon Guards. During the Boer War Colonel Baden-Powell, with a force of 1200 men, was besieged for 215 days by a large Boer army in the town of Mafeking, and

notwithstanding famine and sickness and a number of desperate assaults by the Boers, he held out until he was relieved (May 18, 1900). In recognition of his great ability and imperturbable coolness in conducting the defense, he was advanced to the rank of major-general. He became chief of the South African Constabulary in 1900, and inspector-general of cavalry in 1903. In 1908 he became a lieutenant-general, commanding the Northumbrian territorials, and in the same year he inaugurated the boy-scout movement (q.v.). His principal publications are: *Pig-Sticking or Hog-Hunting* (1889); *Reconnoissance and Scouting* (1890); *Vedette* (1890); *Cavalry Instruction* (1895); *The Downfall of Prempeh* (1896); *The Matabele Campaign* (1896); *Aids to Scouting* (1899); *Sketches in Mafeking and East Africa* (1907); *Scouting for Boys* (1908); *Boy Scouts beyond the Seas; My World Tour* (1913).

**BADENWEILER,** bä'den-vī'lēr. A town of Baden, Germany, situated among the spurs of the Black Forest, 700 feet above the Rhine and 1450 feet above sea level. It is well sheltered, has an equable temperature, fine air, and is visited annually by from 6000 to 7000 tourists. There are beautiful promenades and numerous villas in the vicinity, and the town contains a grand-ducal palace dating from the sixteenth century, a Kur-haus, Kur-park, etc.

**BADGE,** or COGNISANCE (LL. *bagea, bagia,* OF. *bage,* sign; cf. AS. *beág, beáh,* ring, ornament, LL. *baga,* Fr. *bague,* ring). A figure either selected by the owner from some part of the family coat or chosen as alluding to his name, office, or estate, or granted by the sovereign as a token of his favor. Badges were much used in England from Edward I to Elizabeth. The principal noble houses, in imitation of the royal family, had a distinctive mark for their retainers, the whole coat of arms being often too complicated to reproduce. Some of these badges are well known in history, and many have been perpetuated in the signs of old inns, with the memory of their origin entirely lost. Such are the white hart of Richard II, the bear and ragged staff of Warwick, the three feathers of the Prince of Wales (though King Stephen used this badge before the Black Prince's time), and the roses of York and Lancaster. Queen Anne was the last English sovereign to use a personal badge; she had the rose of England and the thistle of Scotland growing from one stem and imperially crowned. The term is loosely applied at the present time to various society emblems. See the illustration accompanying the article FRATERNITIES, COLLEGE.

**BADGER,** bäj'ẽr (probably from *badge,* alluding to the white mark on its head). Any of several small, burrowing carnivores of various genera, scattered throughout the warm and temperate parts of America, Asia, and Europe, and constituting, with the skunks, to which they are closely allied, the subfamily Melinæ in the family Mustelidæ. The group is characterized mainly by short, strong legs, elongated and more or less plantigrade feet, and straight, strong, fossorial toes. All are heavily furred, distinctly marked, and possessed of great strength, acuteness, and courage. They inhabit dens and are abroad mostly at night. They are provided with perineal glands, which contain substances emitting a fetid odor, the service of which, probably, is to attract the sexes. The pelts have considerable value as furs, and the hairs are largely used in making artists' brushes. The flesh is edible, but not often eaten in civilized communities.

The AMERICAN BADGER (*Taxidea americana* or *taxus*) is about 2 feet long, and has an appearance of remarkable breadth and flatness. The legs are short and firm, and the large feet are furnished with long and very strong claws, making them powerful digging tools. The tail is short and thick. The head is broad, massive, and dog-like, with round, furry ears, a hairy muzzle, and jaws filled with formidable teeth, scarcely less serviceable than those of the wolverine. The whole squat, compact, large-boned, massively skulled form indicates great muscular power, and it is controlled by a well-developed brain and great courage. The loose fur is a blend of blackish with white, gray, or tawny, except as to the feet, which are blackish brown. The head is strikingly marked, the general color, from the back of the neck forward, dark brown, broken by a distinct white stripe from the bridge of the nose back to the nape of the neck, and a somewhat irregular white stripe on each cheek, reaching from the corners of the mouth to near the top of the ears. Below this on each side is a crescent-shaped, dark-colored patch, separating the stripe from the white of the ears and throat. These conspicuous markings give to the countenance an expression of native ability and shrewdness in the disguise of a painted clown. This animal formerly ranged from Ohio westward, but now is not known east of the dry plains, except in Minnesota. It is found northward almost to Hudson Bay and southward into Mexico, where the local form (*T. berlandieri*) is called *tejon.* The badger's stronghold is in the arid regions that abound in gophers and similar burrowing rodents, which he digs out with ease or sometimes catches by a leaping chase. These form his principal food, and he is likely to seize and enlarge their burrows for himself; but birds, frogs, lizards, snakes, insects—in short, any animal food not carrion—are welcome to him. On the whole he fares well by digging out the snugly ensconced striped squirrels, prairie dogs, and other small animals from their underground retreats; and in this practice he serves the agriculturist a friendly turn. In New Mexico the badger is active all the year round, but in Canada it goes into its burrow as soon as the ground freezes and sleeps through the winter with no store of food other than its own fat. When surprised away from its hole, a badger will usually strive to avoid being seen by flattening itself upon the ground. If cornered, it will fight with the greatest courage. Young badgers occasionally are captured, and make interesting though hardly affectionate pets. They exhibit amazing strength in moving barriers and breaking bonds. The pelt is prime about October 1. It is strong and a beautiful silvery gray and brings from 75 cents to $1.50. During the 64 years from 1842 to 1905 over 80,000 badger skins were collected by the Hudson's Bay Company. For details of its life consult E. T. Seton, *Life Histories of Northern Animals,* vol. ii (New York, 1909). See Plate of MINOR AMERICAN CARNIVORES with CARNIVORA.

The EUROPEAN BADGER (*Meles taxus*) is similar to the American in size and colors, but different in dentition and other details. In the absence of open plains it haunts deeply wooded places and digs a deep chamber, where it spends

the winter, and where in spring four or five naked and blind young are produced. It is omnivorous in a wild state as well as in confinement; fruits, roots, beech mast, eggs, young birds, small quadrupeds, frogs, snails, worms, and insects equally constitute its natural food. It has been known to visit a garden for strawberries. It is also fond of honey and of the larvæ of wasps and wild bees, for which it digs up their nests, its shaggy hair protecting it from their stings. Its strength and courage are conspicuous. A barbarous sport was formerly practiced, called badger baiting or "drawing the badger." A badger kept in a burrow or a barrel was assailed by dogs, until at last, yielding to superior numbers, it was dragged out, upon which it was released and permitted to go back to its den, to recover itself and be baited again. This often happened several times daily when the badger was kept as an attraction to a public house of the low sort. The verb *to badger*, expressive of persevering annoyance by numerous assailants, arose from this practice. An old English name for the animal was "grey," and in Scotland and northern England the badger is still called a "brock" (see *Twelfth Night*, Act ii, Scene 5), and is frequently kept in captivity. (Consult Johnston, *British Mammals*, London, 1903). Several closely related species belong to the Asiatic fauna, where also are other relatives of different genera.

The SAND BADGER, or BALISAUR (*Arctonyx collaris*), of northeastern India and Assam, is a yellowish animal, taller and larger than the common badger and looking like a small bear. It is nocturnal and omnivorous in habits and is considered very fierce. The STINKING BADGER, or TELEDU (*Mydaus meliceps*), is an odd little burrower and insect eater of Java, with a skunk-like power of emitting a powerful stench. H. O. Forbes says of this animal: "Another slow prowler, the *Mydaus meliceps*, very often made my evening hours quite unbearable by the intensely offensive odor with which, even in its most inoffensive frame of mind, it hedged its crepuscular walks for at least a mile around . . . with a malignant scent that clung to one's garments, furniture, and food for weeks. . . . The natives have a superstition that if a man has fortitude enough to eat its flesh he will have become proof against sickness of all kinds."

The common HONEY BADGER of India, and the RATEL, or CAPE BADGER, of South Africa, are somewhat more distant relatives, closely allied to each other and forming the genus *Mellivora* of the subfamily Mustelinæ. Their coloration is peculiar, all the upper surface of the body, head, and tail being ashy gray, while the lower parts, separated by a distinct longitudinal boundary line, are black. Both are vigorous diggers and are even accused of robbing graves. Their generic name alludes to their observed fondness for honey (the ratel really hunts for bees with great sagacity), but they subsist upon living animals. Certain small raccoon-like animals of India and eastward, constituting the genus *Helictis*, and the Cape polecat (*Ictonyx zorilla*) of South and West Africa, which is remarkably like an American skunk in appearance and habits, complete the group of the nearest relatives of the badger.

**BADGER,** CHARLES JOHNSTON (1853– ). A rear admiral in the United States navy, born at Rockville, Md. Appointed at-large to the United States Naval Academy by President Grant in 1869, he graduated four years later. He was promoted through successive grades to a captaincy in 1907 and became also in that year superintendent at Annapolis. During the world cruise of the Atlantic fleet in 1909–11 he was in command of the battleship *Kansas*. Soon afterward (in 1911) he was made a rear admiral and was given the command of the second division of the Atlantic fleet, with the rank of rear admiral. Of the entire Atlantic fleet he assumed command on Jan. 5, 1913.

**BADGER,** GEORGE EDMUND (1795–1866). An American statesman, born at Newbern, N. C. He graduated at Yale in 1813, studied law, and practiced in Raleigh. In 1816 he entered the State Legislature and later served as judge of the Superior Court of North Carolina. In 1841 he was appointed Secretary of the Navy by President Harrison, but after Harrison's death resigned because he disapproved of President Tyler's veto of the Bank Bill. He was elected to the Senate in 1846 to fill a vacancy and in 1848 to a full term. In 1853 President Fillmore nominated him as a judge of the United States Supreme Court, but the Senate would not confirm the nomination. He was an opponent of secession.

**BADGER,** OSCAR C. (1823–99). An American naval officer, born at Windham, Conn. He entered the navy as midshipman and served during the Mexican War. In 1861–62 he was in command of the *Anacostia*, of the Potomac flotilla, and for the precision of his fire was frequently mentioned in the reports of Lieutenant Wyman, commanding the flotilla. He was promoted to be lieutenant commander in 1862, and in 1863 commanded the ironclads *Montauk* and *Patapsco* in many engagements with the batteries and forts of Charleston Harbor. In 1863, while acting fleet captain on board the flagship *Weehawken*, he was severely wounded. In 1866 he was appointed commander, in 1881 commodore, and in 1885 was retired.

**BADGER DOG.** A dog formerly used in hunting or in baiting badgers. In England the basset, an almost extinct breed of medium-sized, long-bodied, short-legged hounds, was so used; and the German dachshund (q.v.) of the present originated in a breed adapted to pursuing badgers into their holes, the word meaning 'badger-dog.' It is said that the greyhound had a similar origin; but although a coarse sort of greyhound may probably have been used often in the sport of baiting badgers (called "greys"), this breed originated otherwise in the Orient.

**BADGER STATE.** See STATES, POPULAR NAMES OF.

**BADGHIS,** băd-gēz', or **BADGHIZ** (Pers. the place where the wind rises). A region in the northwestern part of Afghanistan, bounded by the Heri-Rud and the Persian and Russian frontiers. It is mountainous in the centre, taking in a portion of the Paropamisus Range. The southeastern portion is less elevated and fertile. It is inhabited by Jamshidis and Hazaras.

**BADHAM,** băd'am, CHARLES (1813–84). A distinguished English classical scholar, professor of classics and logic at the University of Sydney, New South Wales, from 1867 until his death. He was born at Glasgow, Scotland, as the son of Charles Badham, Regius professor of physics at Glasgow and the translator of Juvenal, and of a cousin of the poet Thomas Campbell. He received his early education under Pestalozzi, in

Switzerland. He graduated at Oxford (1837), after which he spent some time in Italy, studying ancient manuscripts, and in Germany. He was a warm friend of Cobet. His chief publications are: *Criticism Applied to Shakspere* (1846), and annotated editions of the Greek classics, including the *Iphigenia* and *Helena of Euripides* (1851); and the *Philebus* (1855), *Euthydemus* (1865), and *Laches* (1865) of Plato. In his criticism of texts he followed the methods of Porson. Consult Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

**BADIA Y LEBLICH,** bä-dē'ä ē lä-blēch', Domingo (1766–1818), known also by the name Ali-Bei-el-Abbassi. A Spanish traveler. He was born at Barcelona, and studied the Arabic language, physical science, and mathematics at Valencia. Partly out of personal curiosity and partly as an emissary of the Spanish government, he determined to visit the Barbary States in the disguise of a Mussulman. He went for a short time to London to study commerce and politics and spared no labor to make himself familiar with the manners and customs of the people he was about to visit. In 1803 he sailed for Africa, where he represented himself, under the name of Ali-Bei, as a descendant of the Abbassides. His talents gained for him such esteem that he was invited to the court of the Emperor of Fez and Morocco. After a two years' residence in Morocco he set out on a pilgrimage to Mecca in 1805, and after sojourning some time in Tripoli, Cyprus, and Egypt, arrived at the "holy place" in 1807, being the first Christian to visit it since the institution of Islam. Subsequently he visited Jerusalem and the chief places in Palestine and Syria, and in the autumn of 1807 arrived at Constantinople, whence he had soon to flee, the genuineness of his Mohammedanism being suspected. His long journey had been a bold masquerade, carried out with exquisite art. He deceived Moslem emperors and scholars; and in Cairo Châteaubriand spoke of him as the most cultured and polished Mussulman he had ever met. After his return to Spain he was made Intendant of Segovia and Prefect of Cordova by Joseph Bonaparte. On the expulsion of the French, Ali was compelled to leave the country. He went to Paris, where in 1814 he published an account of his travels, under the title *Voyages d'Ali-Bei en Afrique et en Asie pendant les années 1803–07*. The work was translated into the principal European languages. Four years after the publication Badia y Leblich set off on another journey to the East, but died suddenly at Aleppo.

**BADINGUET,** bä'dăn'gā'. Napoleon III, often so called because the garments in which, in 1846, he escaped from the castle of Ham, belonged to a mason of that name. His party came to be known thereafter as the "Badingueux."

**BADIUS,** bā'dē-ụs, Jodocus, or **BADE,** bād, Josse (1462–1535). A French printer and author. He was born at Asche, near Brussels, and for this reason is sometimes called Ascensianus. He studied at Brussels and Ferrara and for several years taught Greek at Lyons. About 1500 he settled in Paris, where he founded a printing establishment and published, with his own notes, a large collection of the classics; also produced a *Life of Thomas à Kempis*, and a satire on the follies of women, called *Navicula Stultarum Mulierum*. His printer's stamp is the oldest-known reproduction of a printing press.

**BAD LANDS.** An American term applied to regions of unconsolidated rocks that have been extensively eroded. Bad Lands occur on arid plateaus formed by horizontal strata of loosely cemented sands and gravels. In these regions rain falls only during short periods, but then the storm waters erode the incoherent rock that is unprotected by vegetation, resulting in the formation of a labyrinthine series of valleys of all sizes, most of which are dry "arroyos" during the greater part of the year. When the erosion is carried to its extreme limit, the greater part of the region is reduced to base level, and isolated fragments of the old plateau rise above this to form table mountains, or "mesas." The best examples of Bad Lands are found in the upper portion of the Missouri drainage basin, in the vicinity of the Black Hills. They occur also to lesser extent in Colorado, Arizona, New Mexico, and Texas. The name "Bad Lands" is a literal translation of "Mauvaises Terres," a term used by the French-Canadian trappers, who first visited the regions.

**BAD'MAN,** The Life and Death of Mr. An allegorical tale by John Bunyan in 1680. As a realistic picture of the masses during Charles II's reign, it is quite as vivid as anything of Defoe's or Pepys's.

**BAD'MINTON** (from Badminton, England, the seat of the Duke of Beaufort). A game which much resembles lawn tennis. It can be played by two or four players, either in or out of doors, on a marked-out space 44 feet long by 20 feet wide for the four-handed and 17 for the two-handed game, divided into 4 courts, 2 at each end, with a centre space, across which a net is fixed, 5 feet from the ground at the centre, and 5½ feet at the posts. It is played with shuttlecocks, having 16 feathers, from 2½ to 2¾ inches long and weighing from 73 to 85 grains, which are driven by rackets or battledors over the net, backward and forward, until one of the players fails, under certain technical regulations applicable to the game, to return it. The racket is strung with fine gut and weighs usually about 6 ounces.

**BADMINTON,** The. A large London club of sporting men, so named in honor of the Duke of Beaufort's estate. It was formed in 1876.

**BADOC,** bä-dōk'. A town of Luzon, Philippines, in the province of Ilocos Norte (Map: Philippine Islands, C 2). It is situated near the coast, about 22 miles south of Laoag, and in 1903 had a population of 12,564.

**BADOURA,** bä-dōō'rä. In the story of Prince Camaralzaman in the *Arabian Nights*, the daughter of the King of China, who falls in love with the sleeping prince.

**BADRULBUDUR,** bä-drōōl'bōō-dōōr'. Aladdin's wife in *The Arabian Nights' Entertainments*. She is a beautiful Chinese princess. Despite her love for her husband, she twice nearly causes his undoing by giving away the "wonderful lamp."

**BAEDA.** See Bede.

**BAEDEKER,** bĕd'e-kēr, Karl (1801–59). A German publisher, born at Essen. In 1827 he set up a bookshop at Coblenz and in 1839 published travelers' handbooks for Belgium and Holland. These were succeeded by the *Handbuch für Reisende durch Deutschland und den österreichischen Kaiserstaat* (1842), and by guides to Switzerland (1844) and Paris and environs (1855). Thus was inaugurated this series of world-famous publications. Since 1861 English editions have appeared. The collection

now includes almost all European countries, and portions of North America and the Orient, as well as monographs on London, Paris, and Berlin. The volumes are supplied with excellent maps. In 1872 the firm removed to Leipzig, where complete revisions are frequently prepared.

**BAEHRENS,** bĕr'ens, EMIL (1848–88). A German Latinist, born at Bayenthal. He studied classical philology at Bonn and Leipzig, was appointed instructor at Jena in 1873, and was professor at Groningen from 1877 until his death. His editions of the classics, though often marred by careless haste or bitter attacks on his opponents, are considered valuable because of the use they make of new manuscripts. His publications, which were extremely numerous, include *C. Valerii Flacci Argonauticon* (1875); *Catulli Veronensis Liber* (2 vols., 1876–85); the *Silvæ* of Statius (1876); and *Poetæ Latini Minores* (5 vols., 1879–83, with the additional volume of *Fragmenta Poetarum Romanorum,* published in 1886). In the preparation of the last-named work he examined over 1000 manuscripts.

**BAEKELAND,** bā'ke-länd *or* bā', LEO HENDRIK (1863– ). A Belgian-American chemist. He was born at Ghent and was educated at the university there, receiving the Doctorate of Science in 1884. He later studied electro-chemistry in the school of technology at Charlottenburg, Germany. After teaching chemistry and physics for several years at the university in his native city and in the normal school of science at Bruges, he came to America in 1889 and engaged in the manufacture of photographic papers of his own invention, including the widely used Velox paper. In 1899 he entered industrial practice as consulting research chemist. His best-known invention is Bakelite, a condensation product of carbolic acid and formaldehyde, which possesses a variety of valuable properties and is used as an electric insulator and as a substitute for amber, celluloid, and similar materials. In recognition of the value of this invention the American Chemical Society conferred upon him the Nichols medal and the J. Willard Gibbs medal. He contributed to scientific journals a number of original papers on photo-chemical and electro-chemical subjects and was president of the American Electro-chemical Society in 1909 and of the American Institute of Chemical Engineers in 1912.

**BAENA,** bā-ā'nä (*Baniana, Biniana* of the Romans). A town of Spain, in the province of Córdova, situated about 32 miles southeast of the city of Córdova (Map: Spain, C 4). There are interesting remains of ancient and mediæval times here; of the old Roman town there are a number of relics. The town has stock-raising interests, and manufactures silk, spirits, soap, and flour. It also carries on a trade in grain, esparto, fruit, and wine. Pop., 1887, 12,036; 1900, 14,539; 1910, 14,730.

**BA'ER,** GEORGE FREDERICK (1842–1914). An American lawyer and capitalist, born in Somerset Co., Pa. He was educated at Franklin and Marshall College. After serving in the Civil War, he was admitted to the bar in 1864 and became confidential legal adviser to J. Pierpont Morgan. In 1870 he was counsel to the Philadelphia and Reading Railway Co., for some time was one of its directors, and in 1893 helped to reorganize the corporation. He became its president in 1901 and president also of the Philadelphia and Reading Coal and Iron Co., and of the Central Railroad of New Jersey. He is best known as the leader of the operators in the great anthracite coal strike of 1902. Because of his attitude during this time he aroused the animosity of American labor leaders and of many social reformers. In certain quarters he came to be referred to as "Divine Right" Baer because of a letter that he wrote in 1902 to the Rev. W. F. Clark at Wilkes-Barre, Pa. In this he said: "The rights and interests of the laboring man will be protected and cared for—not by the labor agitators, but by the Christian men to whom God in His infinite wisdom has given the control of the property interests of the country, and upon the successful management of which so much depends."

**BAER,** bâr, KARL ERNST VON (1792–1876). A Russian naturalist, born in the province of Esthonia, Russia. From 1810 to 1814 he studied medicine at the University of Dorpat, and subsequently comparative anatomy with Döllinger at Würzburg, and in 1817 became prosector in the University of Königsberg. He was there appointed professor of zoölogy in 1819 and director of the Anatomical Institute in 1826. In 1829 he became professor of zoölogy and member of the Academy of Sciences at St. Petersburg, but returned the following year to Königsberg. After 1834 he was prominently identified with the Academy of St. Petersburg. He was one of the founders of the modern science of embryology, and was among the most influential scientists of his day. Of his numerous works, the most important are *Epistola de Ovi Mammalium et Hominis Genesi* (1827), in which the mammalian egg is described for the first time; *Ueber Entwickelungsgeschichte der Thiere* (1828–37); and *Untersuchungen über die Entwickelung der Fische* (1835). Consult the study by Stieda (Brunswick, 1878).

**BA'ER,** WILLIAM JACOB (1860– ). An American miniature painter. He was born in Cincinnati and studied at the Royal Academy in Munich under Loefftz, 1880–84. On his return to America he at first practiced genre and portrait painting in New York. In 1892 he took up miniature painting, to which his admirable draughtsmanship was exceptionally adapted, and became the pioneer of the modern miniature in America. When the American Society of Miniature Painters was founded in 1899, he was its secretary and later became its president. To a strong capacity for characterization he unites a broad and pictorial technical treatment, excelling especially in his delicate color. Works like "Primavera" and the "Hours" rank with the very best that has been produced in this art. Among his other well-known works are "Madonna of the Auburn Hair," "Daphne," "The Golden Hour," "Aurora," "In Arcadia," and "The Apple."

**BAERLE,** bär'le, CORNELIUS VAN. A cultivator of tulips in the story of the elder Dumas, *La tulipe noire.*

**BAERLE.** See BARLAEUS, KASPAR.

**BAETHGEN,** bĕt'gen, FRIEDRICH (1849–1905). A German evangelical theologian and Orientalist, born at Lachem. He studied at Göttingen, Kiel, and Berlin, and held professorships at Kiel, Halle, and Greifswald. In 1895 he was appointed professor of Old Testament exegesis and Semitic languages at the University of Berlin. His works include *Untersuchungen über die Psalmen der Peschita* (1878), *Evangelienfragmente* (1885), and *Die Psalmen übersetzt und erklärt* (1892).

**BAEYER,** bā'yĕr, ADOLF VON (1835–1917). A

distinguished German chemist. He was born at Berlin. He studied chemistry under Bunsen and Kekulé, and received the degree of Ph.D. at Berlin in 1858, where he remained as privat docent, becoming assistant professor in 1866. In 1872 he became professor of chemistry at Strassburg. After 1875 he taught at the University of Munich. In 1881 the Royal Society, London, awarded him the Davy medal for his researches on indigo. In 1905 he was awarded the Nobel prize for chemistry. Professor Baeyer was one of the greatest organic chemists. He succeeded in synthesizing a remarkably large number of carbon compounds, including new classes of substances, some of which are not only important from a theoretical point of view, but have also found extensive application in the arts. His works in two volumes were published at Brunswick, Germany, in 1905. For his process in making artificial indigo, see INDIGO.

**BAEYER,** JOHANN JAKOB (1794–1885). A German soldier and geologist. He was born at Müggelsheim, Prussia, and educated at Berlin. He served with distinction in the War of Liberation, and in 1821 entered the topographical bureau of the general staff. He was intrusted with the task of preparing a triangulation of East Prussia. He became chief surveyor of the general staff in 1843 and in 1852 was promoted to the rank of major-general. His plan for a general survey of central Europe was accepted by the Prussian government, and in 1867 the survey was extended to embrace all of Europe. When the Central Bureau of European Surveys was established in 1865 at Berlin, Baeyer was appointed president, and four years afterward he was elected president of the Geodetic Institute. His numerous important works include: *Die Verbindungen der preussischen und russischen Dreiecksketten* (1857); *Ueber die Strahlenbrechung in der Atmosphäre* (1860); *Ueber Die Grosze und Figur der Erde* (1861); *Das Messen auf der sphäroidischen Erdoberfläche* (1862).

**BAEZ,** bä'ās, BUENAVENTURA (1820–84). A president, for four terms, of the republic of Santo Domingo. He was the son of a mulatto, inherited a large fortune, and was prominent in securing Dominican independence. He was president of the republic from 1849 to 1853, when he was driven from the country by Santa Ana. He returned in 1856, was again made president, and in January, 1858, was again driven out, but in 1865 returned once more, and was elected for the third time. The next year an insurrection drove him into exile, and in the following year he was again restored. He strove to have the United States annex the country, but the United States Senate refused to ratify the treaty which he and President Grant had drawn up in 1869 for the purpose.

**BAEZA,** bä-ā'thȧ. An old town of Spain, in the province of Jaén, about 22 miles northeast of the capital city (Map: Spain, D 3). It is in a fertile region, the leading products of which are barley, wheat, vegetables, and oil, and has manufactures of spirits, soap, and leather. Many cattle are raised in this district. Pop., 1900, 14,379; 1910, 15,843. Baeza, anciently known as Vivatia, was prosperous under Gothic kings, and flourished under the Moors, several of whose caliphs and kings resided here. It was taken from them by Alfonso VII in 1147, only to change hands several times. In the thirteenth century it was sacked by St. Ferdinand. It was formerly the seat of a university, founded in 1533, and contains evidences of former splendor. The cathedral, several fine churches, the oratory of St. Philip Neri, and the university, are among its interesting buildings.

**BAF'FIN,** WILLIAM (1584–1622). An English navigator. He accompanied James Hall in his search for a northwestern passage in 1612, and in 1613 commanded the English whaling fleet in the Arctic seas. In 1615 he went north in the *Discovery* under Bylot and explored the inlet now known as Baffin Bay. He was killed in 1622 while trying, in conjunction with a Persian force, to expel the Portuguese from Ormuz. Baffin was the earliest recorded navigator to attempt to determine longitude at sea by astronomical observation. Consult C. R. Markham's edition of the *Voyages of William Baffin* (London, 1881) for the Hakluyt Society.

**BAFFIN BAY.** A part of the northern Polar Sea between Greenland in the east and Baffin Land and North Devon in the west (Map: North America, F 2). It is about 800 miles long, with an average breadth of 280. Its greatest depth is 6890 feet. The tides do not rise more than 10 feet. The currents are generally toward the south, though on the east side of Davis Strait and Baffin Bay a current from Spitzbergen flows northward round Cape Farewell. The bay is scarcely ever free from ice, though during the summer months it is usually open, but sometimes ice-choked in Melville Bay and farther north. The shores are for the most part lofty and precipitous, backed by ranges of snow-clad mountains. The prevailing rocks are granite and gneiss. There are Danish settlements on Disco and Whale islands, and Eskimos inhabit the east coast from Cape York to Smith Sound. The principal animals are, on land, bears, black foxes, and hares; in the sea, the black whale, walrus, and seal, gulls, ducks, and other sea fowl. Baffin Bay was first explored in 1615 by William Baffin, and the accuracy of his observations and descriptions has been confirmed by subsequent navigators.

**BAFFIN LAND.** A large island west of Greenland, constituting a part of the Canadian District of Franklin. Its area is not accurately known, the west coast not having been as yet entirely outlined, but it is about 238,000 square miles, making Baffin Land the fourth largest island in the world. The east coast is mountainous and glaciated and is deeply indented by large bays. A few Eskimos are found along the east coast. The island is named in honor of William Baffin (q.v.). (Consult Franz Boas, *Baffin Land*, 1885, and *The Eskimo of Baffin Land and Hudson Bay*, 1901.) After nearly a year spent in exploring Baffin Land, Bernhard Hantzsch died there in June, 1911, leaving an account of his work and maps that was published in *Mitt d. Verein f. Erdkunde zu Dresden*, Band ii, pp. 669–716 (1913).

**BAFFO,** bäf'fō. See PAPHO.

**BA-FYOT,** bä'fē-ōt', or **BA-FIOT.** A Bantu tribe (also called Cabinda), living between the lower Kuilu and the Congo estuary. They are industrious and skillful, good boat builders, and reputed the best craftsmen on the West African coast. They have profited by contact with Europeans more than other tribes in this region, but still burn witches and combine paganism and Christianity in their religion.

**BAGAMOND'S ROLL.** See BAGIMONT'S ROLL.

**BAGAMOYO**, bä'gȧ-mō'yō. A seaport town and caravansary of German East Africa, situated a short distance northwest of Dar-es-Salaam (Map: Belgian Congo, G 4). It has few stone houses, as the natives, who constitute the bulk of its population, live mostly in huts. There are a custom house, a post office, and a park, with a monument to the troops who fell during an uprising of the natives in 1889. The town is connected by cable with Dar-es-Salaam and Zanzibar. Its roadstead is accessible for small boats. The region is fertile, and the town is a trading centre. Grain, bananas, and vegetables are among the important products. There is considerable caravan trade in ivory, cotton, and manufactured goods. The population is about 25,000 and includes only a few Europeans. Consult Dietert, "Bagamoyo und Handel und Wandel in Deutsch-Ostafrika," in Jahrg. ii *Beitrage zur Kolonialpolitik und Kolonialwirtschaft* (Berlin, 1901).

**BAGANDA.** See UGANDA PROTECTORATE.

**BAGARA**, bȧ-gä'rȧ. A tribe of pastoral Arabs in the Egyptian Sudan, on the White Nile, above Khartum.

**BAGARIA.** See BAGHIRMA.

**BAGASSE**, bȧ-gäs' (Fr. dialectic by-form of *bagage*, baggage, lumber), CANE STRAW, or CANE TRASH. The refuse matter left after the extraction or expression of the saccharine juice from sugar cane and sorghum. It was formerly used mainly for fuel in the sugar house, but is now fed to live stock and employed in paper making, etc. See SUGAR.

**BAGATELLE**, băg'ȧ-tĕl' (Fr., It. *bagattella*, dim. of *bagata*, trifle, from Low Lat. *baga*, bundle; cf. bag, baggage). A game some forms of which are akin to pool, inasmuch as they are played with cues and balls upon a cushion-rimmed table. The table is usually about 7 feet long and 38 inches wide. At the head (which is semicircular) a group of 9 cups, set into the bed of the table, are arranged and numbered as follows:

5
3 2
8 9 7
4 6
1

It is played with 9 balls, one black, four red, and four white, or eight white and one red or black. The red or black ("King") ball is placed on a spot in front of hole 1, and the player strikes a ball at it from the balk line at the end of the table, and endeavors to put it, his own, or both balls into a hole or holes. Whatever hole the king ball falls into counts double. The remainder of the balls are driven, one by one up the table in like manner, and the sum total of the holes they drop into is the player's score.

In "Mississippi" a bridge with nine or more arches is placed in front of the first hole, and through these arches the ball must pass (but not until it has struck a cushion) before it can reach the holes beyond.

In the "Cannon" game three balls (and sometimes a table without cups) are used, a white, a spot-white, and a black, the object being to place the balls in the pockets by means of "cannon" (i.e., *carom*) play. See BILLIARDS.

In *Sans Egal*, a French form of the game, the players use red and white balls respectively, and play at first on the black ball, each player trying to pocket that ball and then his own without pocketing his opponents. Another form of the game, "Bell Bagatelle," is played on an inclined board fitted with cups, arches with bells, and stalls, each of which is marked with a number.

**BAGAUDÆ.** Peasants of Gaul who resisted Roman oppression about 270 A.D., capturing and destroying Augustudunum (now Autun). Claudius II temporarily repressed them, but Aurelian made concessions to them and proclaimed general amnesty. They rose again in 294, and Maximian was sent against them. Their first leader was Victoria; subsequently there were two, Ælianus and Amandus, the latter calling himself Emperor. The two last named fell in battle, and Maximian utterly defeated their forces; but they were troublesome to Rome until the end of the Western Empire.

**BAGBY**, GEORGE WILLIAM (1828–83). An American humorist. He was educated at Delaware College and afterward had a medical course at the University of Pennsylvania. He then took up editorial work, especially on the *Southern Literary Messenger*, from 1859 till near the close of the war. Subsequently he was made State Librarian and became widely known as a lecturer and humorist, writing over the name "Mozis Addums." He deserves to be remembered as having kept up the old school of Southern humor, founded by Longstreet and Hooper. His works were collected in 3 vols. (Richmond, 1884–86). Consult Trent, *Southern Writers* (1905).

**BAGDAD**, băg-dăd' *or* (as Anglicized) băg'dăd. A vilayet of Asiatic Turkey, situated near the southeastern end of the country, and covering an area of 42,962 square miles (Map: Turkey in Asia, L 6). It is watered by the Tigris and Euphrates, but the soil, with the exception of a small portion, is barren and unproductive. The population is estimated at 614,000, consisting of Turks, Arabs, Armenians, Jews, and Kurds.

**BAGDAD**, or **BAGHDAD.** The capital of the Turkish vilayet of the same name, and formerly one of the most magnificent cities of the Mohammedan world, situated in the centre of the vilayet on both sides of the Tigris (Map: Turkey in Asia, L 6). It is probable that the name is of Iranian origin coming from *Bag*, 'god,' and *dad*, 'given,' 'the gift of god'; for even if Bagdada is the correct reading of the name of a city occurring in Babylonian inscriptions as "Delitzsch maintains," it is by no means impossible that an Iranian tribe established itself in this region as early as in the Kassite period. (See BABYLONIA.) The modern and larger portion of the city lies on the eastern bank and is connected with the old town on the opposite side by two pontoon bridges, 650 and 715 feet long respectively. Bagdad is surrounded by the ruins of a brick wall, and a dry moat, and has an attractive appearance from the river. Upon closer examination, however, it proves to be ill built and neglected, with but few remnants of its former splendor. The streets are crooked, narrow, and filthy, houses are low, and the absence of windows in the front renders them exceedingly sombre and uninviting. The interior, however, is here and there richly decorated, and the courts are sometimes ornamented with artistic fountains. Bagdad contains a large number of mosques (most of them ruined), which alone testify to its former splendor. Among public buildings the most noteworthy are the Governor-General's palace, the citadel, and the numerous *khans*. Bagdad also contains a number of brick-covered bazaars, which have long

been famous. In the vicinity are situated tombs held in high reverence by the natives and visited annually by thousands of pilgrims. In olden times Bagdad was famous as a seat of learning and culture, but at present its high schools or *medresses* are few in number, and its importance is due chiefly to its commerce. Before the opening of the Suez Canal Bagdad was an important centre on the trade route from India to Europe. The traffic from India has declined somewhat, but, owing to development of railway facilities, it is still a place of commercial importance, being the mart through which pass the imports and exports of Mesopotamia, and the outlet for products of Arabia and Persia intended for Eastern markets. Transportation is effected from Basra to Bagdad by the Tigris, and from there to Constantinople, Aleppo, and Damascus by caravans. The chief articles of export are wool, grain, fruits (especially dates), horses, various Oriental fabrics, skins, gum tragacanth, feathers, and leather articles. Imports include iron and copper, sugar, and coffee. There are numerous manufactures of copper utensils, cloth, and felts. Bagdad is the seat of a United States consulate. The population has been repeatedly decimated by pestilence and inundations. It is variously estimated, the returns ranging from 125,000 to 200,000, consisting of Arabs, Turks, Jews, Persians, Kurds, Armenians, Syrians, and some Hindus. The Mohammedan population numbers about 125,000 and is practically equally divided between Sunnis and Shias. There are over 50,000 Jews, 15,000 Chaldæan Christians, besides Jacobites, and Greek Orthodox Christians.

Bagdad was built by the Abbassid Caliph Mansur (Almansur), 762 A.D., on the site of an old Babylonian city of a similar name. It was greatly enlarged by Harun-al-Rashid, under whom and his successor Mamun it attained the prosperity which is described in the pages of the *Arabian Nights*. Then, and for long afterward, it was one of the richest and most splendid cities of the world, except for a brief period when it was deserted by the caliphs. The rise to power of the commander of the caliph's Turkish bodyguard gradually reduced the caliphs to political insignificance, but they retained their headship in religion. In 1258 the grandson of Genghis Khan, Hulaku, put an end to the Abbassid Caliphate; but the descendants of the Tatar conqueror were expelled by Timur, who took the city 1393. In the beginning of the sixteenth century Shah Ismail, the founder of the Sofi Dynasty in Persia, made himself master of it. Turks and Persians strove for its possession until Amurath IV, in 1638, annexed it to the Ottoman Empire. Since then it has been nominally a part of the Ottoman Empire, but for long periods it was practically independent. Consult Le Strange, *Bagdad during the Abbasid Caliphate* (Oxford, 1900); C. Huart, *Histoire de Bagdad dans les temps modernes* (Paris, 1901); Streck in *Enzyklopädie des Islam* (1911).

**BAGDAD.** The port of Matamoros (q.v.), Mexico (Map: Mexico, K 5). It is situated in the State of Tamaulipas at the mouth of the Rio Grande del Norte, on the Gulf of Mexico, but its harbor is not accessible to large vessels. During the Civil War in the United States it was an important trading place for the Confederates, who had to run the blockade of the Federal ships.

**BAGDAD RAILWAY.** See TURKEY.

**BAGE,** ROBERT (1728–1801). An English novelist born at Darley, Derbyshire, Feb. 29, 1728. At the age of 23 he settled at Elford, near Tamworth, where he engaged in the manufacture of paper until his death, Sept. 1, 1801. The prevailing French social theories he embodied in several novels of considerable interest, as *Mount Henneth* (1781), *Barham Downs* (1784), and *Hermsprong* (1796). Consult Ballantyne, *Novelists' Library*, edited by W. Scott (London, 1821–24).

**BAGEHOT,** bāj'ot, WALTER (1826–77). An English economist and publicist. He was born at Langport, Somersetshire, and was educated at University College, London, where he won distinction by his work in mathematics and in mental and moral philosophy and political economy. He began to read law, but never practiced the profession. After a stay of some months in Paris in 1851, where he lived through the coup d'état of December, he returned to England to take part in his father's shipowning and banking business. In 1858 he married the eldest daughter of the Rt. Hon. James Wilson, founder of the *Economist*, which had been established during the Corn-Law agitation to advocate free trade principles. In 1860, on the departure of his father-in-law for India, Bagehot became editor of the *Economist* and retained that position until his death in 1877.

Bagehot's principal works, which were widely translated and passed through several editions, were *The English Constitution* (1867), *Physics and Politics* (1872), and *Lombard Street* (1873). The first work, which has been widely used in England and the United States as a text-book, is a keen analysis of the English system of government. It is striking in its distinction between the "ornamental or theatrical" part and the practical parts, the crown and the House of Lords constituting the first, and House of Commons and the cabinet the second. The vigor of his language would imply that the theatrical parts were useless; but, on the contrary, Bagehot holds them in high honor, despite proposals for reforming the House of Lords. They seem to assure confidence in the stability of government and inculcate a respect for superiority and tradition which is the saving grace of English democracy. In his discussion of the practical parts he brings out strongly the essence of parliamentary government in the blending of executive and legislative authority in the cabinet. He was among the first to point out the excellences of the cabinet system. His work, *Physics and Politics*, expands the thesis that rule and tradition, awakening the spirit of coöperation, is the keynote of political progress. Without this habit of pulling together intellectual nations have failed to maintain themselves.

His *Lombard Street*, which is a description of the rôle that the Bank of England plays in the English financial system, lies in quite another field of thought, for which his training as vice-chairman of the Langport Bank and his position as editor of England's financial organ gave him special facilities of knowledge. The work is a masterly analysis of the English credit system, and its lucidity of statement has gained for it a wide reading and a permanent place in the literature of political economy.

Bagehot was a man of great versatility, whose reputation as one of the best conversationalists of his day will be understood by those who read

his *Literary Studies* and *Biographical Studies*, republished after his death in his collected writings, in which his vivacity and humor find greater scope than in his larger works. Consult the prefatory notice to *Literary Studies*, edited by R. H. Hutton (London, 1879), and M. E. Grant-Duff, "Walter Bagehot: His Life and Works," in his *Out of the Past* (London, 1903).

**BAG'GAGE** (Fr. *bagage*, from OF. *bague*, bundle, pack). In the law of common carriers all such articles of a traveler as are incidental to the journey or required by him during the journey. Thus, personal jewelry and a reasonable amount of money for expenses, as well as wearing apparel, etc., are baggage; but jewelry and goods intended for sale, articles of furniture, etc., are not. The significance of the distinction lies in the fact that the extraordinary liability of the common carrier extends to the baggage of a passenger, and yet, as a carrier of passengers, he is exempt from that liability for goods not coming under the description of baggage. The carrier, however, is liable for damage resulting from his gross negligence, even if the articles shipped or carried by the passenger are not baggage; and his acceptance of them, knowing their character, may put upon him the full liability of a common carrier. See CARRIER, COMMON.

**BAGGAGE**, MILITARY. The impedimenta of an army, including all articles of stores necessary, or pertaining to, a body of men moving from one point to another. Ammunition and food supplies, while coming under this general heading, take precedence of all other baggage, on account of their imperative necessity to the existence of troops in the field. In all armies strict rules are enforced, regulating the amount and description of baggage that may be carried for officers and soldiers at home and abroad, both in time of peace and during war. In the field, though a soldier in the ranks carries his whole kit, yet a certain proportion of wagons are allotted to his command for the heavier baggage —tents, cooking utensils, ammunition, etc. The question of baggage is one of the most difficult problems a commander in the field has to deal with. In the United States the transportation of baggage is covered by sec. 1151, *United States Army Regulations*, which provides that the baggage to be transported at public expense, including mess chests and personal baggage, upon change of station, shall not exceed the following weights:

| RANK | IN THE FIELD, POUNDS | CHANGING STATION, POUNDS |
|---|---|---|
| Lieut.-General | 1,500 | 15,000 |
| Major-General | 1,000 | 10,500 |
| Brigadier-General | 700 | 8,400 |
| Field Officer | 400 | 7,200 |
| Captain | 200 | 6,200 |
| First Lieutenant, Contract Surgeon | 150 | 5,100 |
| Second Lieut and Veterinarian | 150 | 4,500 |
| Post and Regimental non-commissioned Staff Officer, 1st Class Sergeants of the Hospital Corps, Chief Musician, Sergeant of the Signal Corps, Squadron and Battalion Sergeant Majors, First Sergeants, each, and Civil Service employees transferred | ... | 3,000 |

Adequate allowances are made for the expense of packing and crating baggage preparatory to shipment. Official books and papers of officers are transported at government expense and are not charged against the baggage allowances of officers. When officers or soldiers entitled to baggage allowances are retired, their baggage within their allowances is transported to their homes.

**BAGGESEN**, bäg'ge-sen, JENS (1764–1826). A Danish poet, born at Korsör, who in his early works represented eighteenth-century culture and afterward became a representative of a restrained romanticism. His first poems were *Comiske Fortaellinger*, 'Comic Tales' (1785), followed by satires, epistles (*Skiemtsomme Riimbreve*, 1807), and elegies, produced with restless haste, in which, however, he showed himself a conservative champion of form against the innovation of the romanticists, and won the title "poet of the graces." Under the patronage of the Duke of Augustenburg he traveled widely, was for a time director of the National Theatre in Copenhagen, and in 1800 went to Paris. In 1811 he became professor at Kiel and later returned to Copenhagen to find his fame eclipsed by that of the romantic Oehlenschläger (q.v.), who at first commanded his sincere admiration, but later evoked his bitter criticism. He left the field, defeated, for a voluntary exile at Hamburg in 1820. The *Labyrinth* (2 vols., 1792–93), his most important work, is a graceful impressionist's description of his journeys. He wrote also in German and left a vast and entertaining *Correspondence*. Though now little read and never genuinely popular, his work exercised in its time a great influence upon the literary public. His *Danish Works* were first published in 1827–32; his *Poetische Werke in deutscher Sprache* in 1836. Consult: Arentzen, *Baggesen og Oehlenschläger* (Copenhagen, 1870–78); A. Baggesen, *Jens Baggesens Biografi* (ib., 1843–56); Clausen, *Jens Baggesen* (ib., 1895).

**BAGHELKHAND**, bä-gāl'kŭnd' (Ar., Turk. *bagh*, garden + *el*, the + *khand*, hill). A British agency of Central India, situated between lat. 22° 40′ and 25° 10′ N. and long. 80° 25′ and 82° 45′ E. It comprises the native states of Rewah, Nagode, Maihar, Sohawal, and eight of lesser importance. Area, 14,706 square miles. Pop., 1891, 1,737,606; 1901, 1,554,577; 1911, 1,772,574.

**BAGHERIA**, bä'gā-rē'ä, or **BAGARIA**, bä'gā-rē'ä. A city in the province of Palermo, Sicily, 8 miles southeast of the city of Palermo (Map: Italy, H 9). The surrounding plains are splendidly fertile, and the town contains many deserted villas, formerly occupied by Palermo grandees. Among them are the Villa Palagonia, celebrated by Goethe, and the Villa Valguarnera, which has one of the most beautiful prospects in Sicily. Pop., 1881 (commune), 14,000; 1901, 18,218; 1911, 21,212.

**BAGIMOND'S** (bāj'ĭ-mŏnds), or **BAGIMUND'S** (bāj'ĭ-mŭndz) **ROLL.** The name given, from the end of the thirteenth century till the Reformation, to a valuation, according to which the ecclesiastical benefices of Scotland were taxed. It took its name from an Italian churchman, Boiamund de Vitia, who was sent from Rome in 1275 to collect the tithes from all the church livings in Scotland for an expedition to the Holy Land, as decreed by the Second Council of Lyons (1274). Hitherto the Scotch clergy had been taxed according to a conventional valuation, called the *antiqua taxatio;* but Boiamund set this aside, and, in spite of their opposition, assessed the benefices at their actual yearly

worth, or *versus valor*. Consult *Publications of the Surtees Society*, vol. xii (London, 1846).

**BAGINSKY,** bä-gēn'skĭ, ADOLF (1843– ). A German physician. He was born at Ratibor, and studied at Berlin and Vienna. In 1890 he was appointed director of the hospital known as the Kaiser- und Kaiserin-Friedrich Krankenhaus, in Berlin, an institution devoted chiefly to the cure of the infectious diseases of children. He was private lecturer on children's diseases at the University of Berlin from 1881 to 1892, and in 1892 was appointed extraordinary professor at that institution. He founded and became coeditor of the *Archiv für Kinderheilkunde*, established in 1880. His principal works include: *Handbuch der Schulhygiene* (3d ed., 1898–1900); *Lehrbuch der Kinderkrankheiten* (8th ed., 1905); *Pflege des gesunden und kranken Kindes* (3d ed., 1885); *Das Leben des Weibes* (3d ed., 1885); *Die Antipyrese im Kindesalter* (1901); *Sanglingskrankenpflege und Sanglingskrankheiten* (1906); *Die Kinderaussage vor Gericht* (1910).

**BAGIRMI,** bä-gēr'mē, or **BAGHIRMI.** A sultanate in the military territory of the Chad, French Equatorial Africa, bounded by Bornu, Wadai, and Lake Chad (Map: Africa, F 3). Its area is estimated at about 70,000 square miles. The population is made of different races, including Fulahs and Arabs, and before the wars with Wadai and Bornu numbered from 1,000,000 to 1,500,000, but has thereby been reduced to three-quarters of that number. The principal occupation is agriculture, but there are also some manufactures of textiles and leather. The form of government is absolute, and an armed force, estimated at over 10,000, is maintained. The prevailing religion is Islam, which was introduced in the sixteenth century. Since the agreement of 1896 between France and Germany Bagirmi has been recognized as belonging to the French sphere of influence. In 1897 a separate treaty was signed between France and the Sultan of Bagirmi, and a French resident appointed at Chekna, the capital. The former capital Massenya was destroyed in 1898. At the end of 1899 Rabah, a usurper of Bornu, invaded the state, but was speedily defeated by the French troops. His sons continued the contest, but by May, 1901, the country was completely pacified.

**BAGLIONI,** bä-lyō'nē. A family of Florentine Renaissance architects, sculptors, and wood inlayers of the fifteenth and sixteenth centuries. The founder was BACCIO D'AGNOLO BAGLIONI (1462–1543), of whose four sons, all artists, two became prominent, DOMENICO (born 1511) and GIULIANO (1491–1555), who followed their father's style. Baccio d'Agnolo, while not a genius, showed real talent in the treatment of palace architecture of moderate size in Florence. He continued the manner of Cronaca (q.v.), whom he had assisted in building the great hall of the Palazzo Vecchio. While not modifying Cronaca's style of exterior, he gave greater elegance and simplicity to the palace courts. Such were the Taddei and Ginori palaces. He showed considerable originality in the Bartolini Palace (1520), and in a couple of villas (Bartolini and Borgherini). The best work of Domenico is the Buturlin Palace.

**BAGLIONI,** CAVALIERE GIOVANNI, called IL SORDO DEL BAROZZO (1571–1644). An Italian painter and art historian. He was born in Rome, where most of his life was spent. His celebrated paintings in the St. John Lateran, St. Peter's, and elsewhere, are examples of the tasteless mannerism of his day and no longer interest us; but it is otherwise with his most important literary work, *Le vite de' pittori, scultori, architetti, ed intagliatori dal pontificato di Gregorio XIII del 1572, fino a' tempi di Urbano VIII nel 1642* (Rome, 1642; Naples, 1733), which is still a valuable source of information.

**BAGLIVI,** bä-lyē'vē, GIORGIO (1669–1707). A celebrated Italian physician of the Iatro-Physical school (see BORELLI); descended from a poor Armenian family. In 1692 he went to Rome, where he attended the lectures on anatomy given by Malpighi. Soon afterward he was appointed professor of anatomy at the Sapienza College, Rome. He was the first to propound the doctrine of "solidism" in medicine, according to which the primary seat of disease is in the solid parts of the organism and not in the fluids, as had been universally maintained previous to his time. His complete works were published under the title *Opera Omnia Medica Practica et Anatomica* (Lyons, 1704). Under the title *De l'accroissement de la médecine pratique* a French translation by Boucher was published (Paris, 1851) of Baglivi's *De Praxi Medica ad Priscam Observandi Rationem Revocanda.*

**BAGNACAVALLO,** bä'nyä-kä-väl'lō (1484–1542). An Italian painter of the High Renaissance. His real name was Bartolommeo Ramenghi, and Bagnacavallo was his birthplace. He was a pupil of Francesco Francia at Bologna and afterward assisted Raphael in the decorations of the Vatican. His later work, however, shows the influence of Dosso Dossi. On his return to Bologna he became the head of the local school. The museum and churches of Bologna are rich in his works, among the best of which are "Christ Crucified" in St. Peter's and a "Madonna with Saints" in the Museum. Good examples of his work are also in the galleries of Berlin, Dresden, Milan, and Paris.

**BAGNÈRES-DE-BIGORRE,** bä'nyâr' de bē'gōr' (Fr. baths of the Bigerrones; see below). A town and watering place situated on the left bank of the Adour, amid lovely scenery, in the department of the Hautes-Pyrénées, France (Map: France, S., E 5). At Bagnères there are 30 mineral springs of varied temperature and chemical composition, each of which is described as a specific for different diseases. There are 10 bathing establishments, and the place is visited annually by 25,000 to 30,000 invalids and tourists. It is a centre for winter sports, fêtes being organized each year. There are marble quarries in the vicinity of the town, which is noted for its manufacture of table tops, chimney-pieces, and woolen knitted goods. Pop., 1901, 8437; 1906, 8591; 1911, 8455. The place was well known to the ancient Romans, who called it Vicus Aquensis, or Aquæ Bigerrionum, and erected there many baths and a temple of Diana.

**BAGNÈRES-DE-LUCHON,** lü'shôn'. A watering place in the department of Haute-Garonne, France (Map: France, S., E 6). It is divided into an old and a new town; the latter, with its villas and gardens, fine streets and promenades, being five times as large as the cluster of mean and narrow streets which forms the old town. Bagnères-de-Luchon has 48 springs, which vary in their composition and their temperature. About 50,000 strangers annually resort to these springs. Pop., 1901, 3260; 1906, 3465; 1911, 3415. The Romans gave it the name Thermæ Lixonienses, but for many centuries, even

throughout the Middle Ages, the place was deserted. Mégret d'Etigny, whose statue stands in the town, caused the waters to be analyzed in 1751 and drew attention to their medicinal properties, but the popularity of the place dates only from the beginning of the nineteenth century.

**BAGNES,** bän'y', or **BAZNE,** VAL DE. A picturesque valley in the canton of Valais, Switzerland, watered by the Dranse, a tributary of the Rhône. It is encircled by mountains, of which the highest are Grand Combin, 14,164 feet, and Mont Gelé, 11,000 feet. Glaciers are found in the valley, the largest being the Corbassière and the Grétroz. Waterfalls and gorges abound along the course of the river, and its current is very swift. It has frequently overflowed and inundated the valley, notably in 1818, when, dammed by the Grétroz Glacier, it broke through and swept away 500 dwellings, drowning a number of people. The chief town of the valley, Chable, is sometimes called Bagnes.

**BAGNES.** The convict prisons of France. Serious crimes in France were, till 1748, punished by terms of service in the galleys. In that year these were abolished, and the convicts were employed in hard labor in arsenals and other public works, and the prisons in which they were lodged were called *bagnes,* from the Italian *bagno,* literally 'a bath'—a name supposed to have originated in the fact that the slave prisons at Constantinople contained baths, or because they stood near the baths of the seraglio. The Legislative Assembly of 1791 and 1792 mitigated the sufferings of the convicts, and substituted, for the detested name *galères,* that of *travaux publics,* to which succeeded the *travaux forcés* of the Code Napoléon. The practice of branding criminals with a hot iron was not abolished until 1832. The latest existing institutions of this class were at Toulon, Brest, and Rochefort. The discipline of the bagnes was cruel. Men were always chained in couples and released only after the most exemplary behavior. Their food was miserable, and they were herded together at night like cattle. The labor of the convicts was turned to profitable account, and the various handicrafts were taught in the prison under the direction of overseers. The industrious and clever were enabled to earn small wages. Formerly the punishment of the galleys was inflicted for comparatively slight offenses, such as removing landmarks, begging, poaching; but hard labor in the bagnes was reserved exclusively for such as committed crimes which seriously menaced the public peace and personal safety. These prisons were abolished in 1854, and the convicts were gradually drafted off to French Guiana and New Caledonia. Toulon Prison was not emptied till 1870. To readers of Victor Hugo's *Les misérables* the bagnes are familiar as the home, during many years, of the hero, Jean Valjean. Consult Zaccone, *Histoire des bagnes* (Paris, 1875).

**BAG'NET,** MR. and MRS. JOE. A gallant ex-artilleryman and his wife in Dickens's *Bleak House.* They have three children, all named after the towns at which they were born, Malta, Quebec, and Woolwich.

**BAGNI-DI-LUCCA,** bä'nyē dē lụk'kä (It. Baths of Lucca). A spa much frequented in the summer, in north Italy, 15 miles northeast of Lucca (Map: Italy, E 3). There are hot springs of various temperatures from 96° to 133° F. scattered over a limited neighborhood. It consists of several villages in the cool and shady valley of the Lima. The springs number 100, and were known in the Middle Ages as the Baths of Corsena. Pop., 1881, 9205; 1901, 12,150; 1911, 12,939.

**BAG'NIGGE WELLS.** A London picnic ground in the reign of George II situated on Gray's Inn Road, across from the present Mecklenburg Square. It was elaborately laid out with promenades, flower beds, and shrubbery, and contained a large single-roomed hall for entertainments of various kinds. It contained medicinal springs and originally consisted of certain baths, founded in 1708 as a rival of Baine's cold-bath establishment. It was highly popular until about 1850.

**BAGOBO,** bä-gō'bō. A Malay people living in the Davao District, Mindanao. They build good houses, are fair agriculturists, and are the best clad of any wild tribe on the Philippines, yet despite this they practice many savage customs, including human sacrifice. Consult *Philippine Journal of Science,* vol. vi, No. 3 (June, 1911); also F. C. Cole, "Wild Tribes of Davao District," *Field Museum Publication* (1913).

**BAG'OT,** SIR CHARLES (1781–1843). An English diplomatist. He became Under-Secretary of State in 1807; special envoy to France in 1814; Minister Plenipotentiary to the United States in 1815; Ambassador to Russia in 1820 and to Holland in 1824, and special Ambassador to Austria in 1835. He became Governor-General of Canada in 1842 and died in office.

**BAGOT,** RICHARD (1860–1921). An English novelist. He was educated in private schools. In 1882 he became the private secretary of the Governor of Western Australia, Sir Frederick Napier Broome. His publications comprise the following: *A Roman Mystery* (1899); *Casting of Nets* (1901); *The Just and the Unjust* (1902); *Donna Diana* (1903); *Love's Proxy* (1904); *The Passport* (1905); *Temptation* (1907); *The Lakes of Northern Italy* (1907); *Anthony Cuthbert* (1908); *The House of Serravalla* (1910); *My Italian Year* (1911); *The Italians of To-Day* (1912; Am. ed., 1913); *Darneley Place* (1912; Am. ed., 1913).

**BAG'PIPE.** A wind instrument, which up to the eighteenth century was common in almost every country in Europe and still continues in use among the country people in Poland, Italy, Sicily, the south of France, Scotland, etc. It consists of a leather bag, which the player inflates by blowing with his mouth through a tube, as among the Scotch Highlanders, or by means of a small bellows. The music proceeds from three or four pipes, whose mouthpieces are inserted into the bag; the wind being forced out by pressing the bag under the arm. One of the pipes, the *chanter,* is a primitive oboe with eight holes; the others, called *drones,* sound each only one continuous low note. It is certain that the bagpipe was in use among the Hebrews and Greeks, and there is enough evidence that in Germany and elsewhere in Europe it was among the most favorite instruments in the fifteenth century.

Though fallen generally into disuse, with the growth of musical refinement, the bagpipe is still a popular instrument in the Highlands of Scotland, and at gatherings of Highlanders, and even of Lowland Scotch, in America and other countries. Pipers in proper costume are also attached to the Highland regiments in England, and in some instances pipers are retained by Scottish noblemen to play on festive occasions.

Skill in playing the bagpipe is promoted by various Highland societies, which at periodical competitions give prizes to the best players of pibrochs, reels, and other airs. Consult E. de Bicqueville, *Les Musettes* (Paris, 1894), and W. H. Grattan-Flood, *The Bagpipe* (London, 1911).

**BAG'RADAS.** An eastern Algerian river, now called Medjerda. Its length is about 200 miles, and it opens into the Gulf of Tunis.

**BAGRATIDES,** băg'rȧ-tīdz, or **PAGRATIDES,** păg'rȧ-tīdz. A noble family of Armenia, descended from the ancient Jews, and converted to Christianity about the close of the third century. In 743 they were made hereditary governors of Armenia by the caliphs, and in 885 the first king of the line was crowned. The dynasty was extinguished in 1079 by the Byzantines. A line of Bagratides ruled in Georgia until 1802, when the last king ceded his territory to Alexander I and became a prince of the Russian Empire.

**BAGRATION,** bȧ-grï'tȇ-ôn', PETER IVANOVITCH, PRINCE (1765–1812). A distinguished Russian general, descended from the noble family of the Bagratides of Georgia. He entered the Russian service in 1782 and was trained under Suvaroff. In 1788 he was engaged at the storming of Oczakov, fought in 1792 and 1794 against the Poles, in 1799 in Italy and Switzerland, and distinguished himself in the Austro-Russian War of 1805 against the French, especially in the sanguinary engagement of November 16 of that year at Hollabrun, when, with a small body of troops, he bravely stood during six hours opposed to the superior forces under Murat, and thus enabled the Russian general, Kutusoff, to reach Znaim with the main army. Subsequently Prince Bagration was engaged in the battles of Austerlitz, Eylau, Heilsberg, and Friedland, and took part in the Russian campaign against the Turks, being defeated in the battle of Tartaritza, 1809. In the campaign of 1812 he commanded the Second Russian Army of the West, and had the misfortune to fail in his attack on Davout, near Mohilev, but succeeded in forming a junction with the First Army of Smolensk. He was mortally wounded in the battle of Borodino and died on October 7.

**BAG'SHOT BEDS** (found in Bagshot Heath in Surrey). A series of sands belonging to the Middle and Upper Eocene of Great Britain. They rest on the true London clay, but their best development is on the Isle of Wight, where a thickness of at least 660 feet is recorded. Certain beds of the series are rich in reptilian and fish remains, as well as in those of mollusks.

**BAGSHOT HEATH.** A level stretch of country near the English counties of Surrey and Berkshire, once the place of many a highway robbery.

**BAG'STOCK,** MAJOR JOE. A character in Dickens's *Dombey and Son.* He is fat, purple-cheeked, martial of speech, and apoplectic. He dines with amazing frequency and heartiness at Mr. Dombey's during that worthy's palmy days; but after the failure of Dombey and Son he severs the acquaintance in words of injured dignity. He lives opposite Miss Tox and is not without an interest in her matrimonial prospects.

**BAGUIÓ,** bä-gē-ō'. A town of Luzon, Philippines, capital of the province of Benguet, 4 miles north of Dagupan, the former capital, with which it is connected by rail. It is a health resort for the American troops, has a large sanitarium, and is the seat of government during the summer months. Pop., 1903, 489.

**BAG'WORM,** or **BAS'KET WORM.** The caterpillar of a moth (*Thyridopteryx ephemeræformis*) common throughout the northern United States, which spins a silken bag as a protection and moves about with it, head downward. It is enlarged as the larva grows, and at last is fastened to a tree branch at one end; within this the caterpillar transforms to pupa, and there the wingless female lays her eggs. The male is a fully winged moth, with dark body and light-colored wings. Bagworms often swarm in city parks and similar situations, and defoliate shade trees, unless the cocoons are collected and destroyed. Compare FAGGOT WORM.

**BAHADUR,** bȧ-hą'dụr, SHAH (c.1767–1862). The last Great Mogul of the House of Tamerlane, who was nominal ruler from 1837 to 1857. For 70 years preceding his accession, however, the East India Company had been firmly established as the controlling force in the Mogul's realm. When he was 90 years old, the Mohammedans of Hindustan made him leader of the movement to reëstablish the Mogul Empire. He took refuge in the tomb of his ancestors when Delhi was captured by the British, but was taken prisoner, tried for rebellion and complicity in the murder of Europeans, and banished to Rangoon, under a sentence of imprisonment for life. He wrote a large number of songs, which were published under the title of *Safar* ('Victory'), and was regarded as the most gifted of the modern poets of Delhi.

**BAHALUL,** bä'hȧ-lōōl'. A character in *The Arabian Nights.* He is nicknamed "The Crazy" and is a fool of Harun al-Rashid's court.

**BAHA'MAS.** A group (the most northerly) of the British West Indian islands, situated in the Atlantic Ocean, between lat. 21° and 27° 31′ N., southeast of Florida and north of Cuba and Haiti (Map: West Indies, D 1). Including the reefs, they number over 3000, of which only about 20 are inhabited. The principal islands are New Providence, Abaco, Harbor Island, Great Bahama, Andros Island, etc. Total area of the group, 4403½ square miles. The islands are long and narrow, with a generally low surface, the highest point attaining an altitude of a little above 410 feet; they are comparatively fertile. Some of the larger islands have a valuable growth of timber. Cotton, which in former times was a staple product, is now little grown (export, 1911, £361), but efforts are being made to revive the industry. Sisal cultivation is important, the estimated area under this plant in 1911 being 20,000 acres, and the output for the year 6,672,780 pounds, valued at £44,855. Other products are maize, pineapples, oranges, grapes, etc. Fishing for sponges and other marine products is one of the important occupations. The climate, although moist, is not unhealthful for whites, though among the negroes there is a high rate of mortality from pulmonary complaints. The mild winter temperature has made the islands, particularly New Providence (the most important, with an area of 85 square miles), a popular health resort.

The imports into the Bahamas in 1911, principally textiles and flour, amounted to £311,095 (£306,098 in 1902), while the exports were valued at £209,251 (£207,601 in 1902). The principal articles of export are sponges, fibre, turtle shell, etc.

The islands are administered by a governor,

assisted by executive and legislative councils of nine members each, and a representative assembly of 29 members. The revenue and expenditures of the colony for 1911–12 amounted to £85,592 (£72,442 in 1902–03) and £82,676 (£74,613) respectively. The capital, Nassau (q.v.), is on New Providence; a United States consul is stationed there. Total population of the Bahamas in 1881, 43,521; 1901, 53,735; 1911, 55,944.

The Bahamas were discovered by Columbus in 1492, though the exact locality of his first landing has been the subject of considerable dispute. (See WATLING'S ISLAND; SAN SALVADOR; GUANAHANI; COLUMBUS, CHRISTOPHER.) The English in 1629 established a settlement on New Providence, from which they were driven by the Spaniards in 1641, in 1680, and again in 1703. In 1703 the settlement was abandoned, and the islands became notorious as the rendezvous of pirates and the scene of wild disorders, until recovered by the British in 1718. Again driven out by the Spaniards (1781), the British were finally confirmed (1783) in their possession. During the Revolution the Bahamas gave refuge to a number of American Tories, whose wealth and slave labor aided materially in the development of the islands. The blockade of the Southern ports during the Civil War made Nassau the chief station in the blockade-running trade and increased the commerce of the islands to an enormous extent. The Bahamas have suffered severely from hurricanes, notably in 1866, 1883, and 1908; and disastrous droughts have occurred. In 1848 the Turks and Caicos islands were separated from the other Bahamas and joined to Jamaica for administrative purposes. Consult *British Empire Series* (London, 1900), and G. B. Shattuck, *The Bahama Islands* (New York, 1905). For further references, see WEST INDIES.

**BAHAR,** bȧ-hȧr′. See BEHAR.

**BAHAWALPUR,** bȧ-hä′wȧl-pōōr′, or **BHAWALPUR,** b'hä′wȧl-pōōr′. One of the native states of the Punjab, India, in lat. 27° 41′ to 30° 25′ N., and long. 69° 30′ to 73° 58′ E., with an area of 17,285 square miles (Map: India, B 3). Pop., 1891, 650,000; 1901, 720,700; 1911, 780,641. The country is remarkably level, and, in spite of various irrigation projects, approximately only one-sixth is capable of cultivation, the fertile portion skirting the Ghara and the Indus. Beasts of chase, such as tigers and boars, abound; domestic animals, camels, kine, buffaloes, goats, and broad-tailed sheep, are raised. The principal exports are cotton, sugar, indigo, hides, drugs, dyestuffs, and wool. The principal imports are the wares of Britain. Bahawalpur is traversed by the Punjab Railway. It is one of the most important Mohammedan states in the district.

**BAHAWALPUR,** or **BHAWALPUR** (*Bhawal* Khan, name of a ruler + Skt. *pur*, city). The capital of the native state of the same name, India, situated 65 miles by rail from Multan, on a tributary of the Ghara, in lat. 29° 24′ N. (Map: India, B 3). It has a circuit of 4 miles—part, however, of the inclosed space being occupied by groves of trees. Bahawalpur has manufactures of silk scarfs and turbans, chintzes, and other cottons, and the immediate neighborhood is remarkably fertile, producing grain, sugar, indigo, tobacco, and butter, with an abundance of mangoes, oranges, apples, and other fruits in perfection. For external commerce Bahawalpur is favorably placed. It stands at the junction of three routes from the east, southeast, and south; while, toward the north, the Hindu merchants have dealings with Bokhara and even with Astrakhan. Pop., 1901, 18,716.

**BAHÍA,** bȧ-ē′a. An eastern state of Brazil, bounded by Pernambuco and Piauhy on the north, Goyaz on the west, Minas Geraes on the south, and the Atlantic Ocean on the east. It has an area of 164,649 square miles. The slightly indented coast is well wooded and is the most fertile part of the state. In the interior the land rises in terraces and forms numerous elevated plateaus, mostly unfit for agricultural purposes. The northern part is taken up by the desert tracts called *sertaos*. The chief river is the São Francisco, which crosses the state from south to north. There are also a number of smaller streams flowing toward the Atlantic, such as the Paraguassu, Itapicuru, and the Rio de Contas, the first two navigable by steamers. The climate is hot and moist on the coast and dry in the interior. In the eastern part tobacco, sugar, cotton, tropical fruits, coffee, and cocoa are raised, and the cultivation of rubber trees has been introduced; but in the west grazing is the most important industry. Gold and diamonds are mined chiefly in the Sierra da Assurua, about the Paraguassu River, while salt and saltpetre are found in many other parts of the state. The commerce is to a large extent with Great Britain and France, and the exports consist of tobacco (used chiefly in the manufacture of cigars, about 70,000,000 being produced yearly), sugar, rubber, coffee, diamonds, and skins. The chief railway line is the Bahía-São Francisco, mostly owned by the state. There is another line from São Amaro to Bom Jardim. Pop., 1890, 1,919,802; 1910 (est.), 2,333,000. Capital, Bahía. Consult *Almanak administrativo do estado do Bahía* (Bahía, 1898); Branner, "The Geography of Northeastern Bahía," *Geographical Journal*, vol. xxxviii (London, 1911).

**BAHÍA** (Sp. and Portug. bay), or São Salvador de la Bahía de Todos os Santos. Capital of the state of Bahía, Brazil, the second city of the country, and the seat of an archbishop, who is primate of Brazil (Map: Brazil, K 6). It is situated on the east shore of the Bahía de Todos os Santos, or Bay of All Saints, from which it takes its name. It is 440 miles southwest of Pernambuco and 800 miles northeast of Rio Janeiro, with both of which cities it has communication by steamship and telegraphic cables. The city is divided into the *cicade baixa*, or lower city, and the *cicade alta*, or upper city. The former is the business quarter, with narrow, close, and dirty streets, while the upper city is clean and cool and commands a magnificent view. Hydraulic elevators connect the two parts of the city, and passenger traffic is also effected between them by means of *cadeiras*, or sedan chairs, the streets being so steep that carriages in many places cannot pass along them. The upper section is pleasantly surrounded by gardens of orange and banana trees and contains some fine buildings, notably the cathedral and the palace of the archbishop. The former edifice, the finest basilica in Brazil, constructed from marble brought from Europe, was the church of the Jesuits. The principal educational institutions are the university, normal school, medical college, museum, and a public library. Electric street railways traverse the city and suburbs, and Bahía is the starting

point and terminus of a railway to the interior. The harbor, protected by the natural breakwater formed by the island of Itaparica, is excellent. It has a circumference of more than 112 miles and is everywhere deep enough for the largest vessels. Extensive improvements were begun in 1909, with the result that the modern facilities instituted permit the mooring along the new docks of the largest ships. Heretofore only small boats could unload at the quays because of the heavy ground swell from the open sea. The ocean liners of the chief maritime powers of the world are represented in the shipping trade of Bahía. The bay and city are defended by an extensive system of fortifications, making it the most strongly protected town in Brazil. Of these defenses the best is the Fort do Mar, or Sea Fort, perched on an artificially enlarged rocky islet in the middle of the harbor.

The city has numerous industries. For upward of half a century Bahía has been the largest producer of cotton cloth, and also the supply base of northern Brazil for shoes, boots, and hats. It has considerable coast trade, the leading exports being sugar, cotton, coffee, hides, dyewoods, jute wares, and tobacco—its snuff having a widespread reputation. In spite of customs restrictions which prevent the full expansion of its trade, imports in 1912 amounted to nearly $17,000,000. Bahía is the seat of a United States consul. It is the oldest city in Brazil; Amerigo Vespucci first entered its bay in 1503; from its foundation, in 1510, by the Portuguese navigator Correa, till 1763, it was the capital of the country. It fell into the hands of Holland in 1624, but not long after was regained by Portugal, remaining in her possession till 1824, more than a year after the proclamation of independence in the rest of Brazil. Pop., 1890, 174,412; 1911 (est.), 290,000.

**BAHÍA BLANCA,** blän'kä (Sp. White Bay). A port of Argentina in the southern part of the province of Buenos Aires, about 450 miles by rail southwest of the capital of the country (Map: Argentina, E 11). The site was occupied as a trading post about 1829, but its development industrially did not begin until 1885. Situated on the Neposta River 3 miles from its entrance into the bay of Bahía Blanca, which offers one of the best harbors along this section of the coast, it is the natural outlet for trade of an extensive fertile region adjacent. The city is in direct steamship connection with European ports. It is well built, well paved, and possesses fine buildings, plazas, parks, hospitals, and all modern conveniences. It is an important railroad centre, and this fact, together with its well-sheltered harbor, has greatly enhanced trade, which has been very active since the beginning of the twentieth century. In 1912 the value of imports amounted to nearly 12,000,000 pesos, while the value of its export trade totaled 69,000,000 pesos. The leading articles of the latter are wool and grain. The Argentine government has established this port as its principal naval base. The United States is represented by a consular agent. Pop., 1901, 14,238; 1912, 72,706.

**BAHÍA HONDA,** ōn'dä (Sp. Deep Bay). A harbor on the north coast of Cuba, in the province of Pinar del Rio, about 55 miles west of Havana (Map: Cuba, B 4). The harbor is one of the best on the island, 5 miles long by 3 miles wide, with a depth of 18 to 36 feet. The town of Bahía Honda is distant about 2 miles. Sugar and tobacco are cultivated to a considerable extent in the vicinity, and there are copper and coal mines. At Aguacate are sulphur springs. Pop., Bahía Honda and Aguacate, in 1899, 1278.

**BAHMAN,** bä'man, PRINCE. A character in "The Two Envious Sisters," a tale of the *Arabian Nights.* Leaving home in quest of adventure, he committed to his sister Parisadê a knife whose magic would reveal to her how he fared.

**BAHNASA,** bä-nä'sä, or **BEHNESA,** benā'sä. A town of central Egypt, situated on the Bahr Yusuf (Joseph Canal) (Map: Egypt, C 2). It occupies the site of the ancient Oxyrhyncus, or Pempte, the capital of a nome in which the fish Oxyrhyncus ('sharp-snouted') was held sacred. Plutarch relates that a feud arose between this city and its neighbor, Cynopolis (Gk. *κύων,* dog + *πόλις,* city), where the dog was revered, on account of mutual insults and injuries to their respective sacred animals. Under the Ptolemaic Dynasty Oxyrhyncus was the seat of a Greek colony, and after the establishment of Christianity it became a city of convents, containing at one time more than 20,000 monks and nuns. Excavations conducted by Grenfell in the neighborhood in 1897 resulted in the discovery of a large number of valuable Greek papyri, including portions of the New Testament and of the works of classical authors (Homer, Herodotus, Thucydides, Sophocles, etc.), some letters, and many legal and commercial documents, illustrating life in Egypt during the Greek and Roman periods. The most important of these papyri have been edited, with translation and notes, by Grenfell and Hunt, under the title *The Oxyrhyncus Papyri* (2 parts, London, 1898–99). The name "Bahnasa" is sometimes applied to the oasis of Bahriyer, near the town.

**BAHR,** bär (Ar. a body of water). The Arabic word for sea, also applied to lakes and rivers. BAHR-EL-ABIAD, ä-bê-yäd' (the White River), and BAHR-EL-AZRAK, el-äz'rēk (the Blue River), are the chief branches of the Nile. BAHR-EL-YEMEN, el-yā'men, is the Red Sea, and BAHR LUT, lōōt, the Dead Sea.

**BÄHR,** bär, GEORG (1666–1738). A German architect. He was born at Fürstenwalde, Prussia. As master builder for the municipality of Dresden he constructed the celebrated Frauenkirche, or Church of Our Lady (1726–40), in that city, which is considered one of the most perfect examples of the baroque style in Germany. He was famous as a builder of Protestant churches, and also erected a number of hotels in Dresden, such as the Hôtel de Saxe (1713–17) and the British Hotel (1720).

**BAHR,** bär, HERMANN (1863– ). A prominent Austrian author and journalist, born at Linz. He studied philosophy, law, and political economy in the universities of Vienna, Gratz, Czernowitz, and Berlin, traveled extensively, and finally made his home in Vienna. In 1890 he became associate editor of the *Berliner Freie Bühne* (*Free Stage*), and in 1892 and 1893 was associate editor and critic of the *Deutscher Zeitung.* In 1894 he began to publish *Die Zeit,* and at other times edited the *Neue Wiene Tageblatt* and the *Oesterreichische Volkszeitung.* In 1906 he became manager of the Deutsches Theater in Berlin. Bahr appeared as an acute critic of the theories of life exploited in modern German and French literature. Although he began his literary career as a naturalist, he later attacked

this school, and tried to introduce into German and Austrian literature some of the features of the French symbolists and "decadents." This effort is especially pronounced in his *Zur Kritik der Moderne* (1890), *Die Ueberwindung des Naturalismus* (1891), and *Neue Studien* (1891). His later critique is contained in *Bildung* (1900), *Secession* (1900), *Premièren* (1902), and *Dialog vom Tragischen* (1903). His novels include *Die gute Schule* (1890); *Dora* (1893); *Neben der Liebe* (1893); *Stimmen des Bluts* (1909). Among his romances are *O Mensch!* (1910) and *Druf* (4th ed., 1910). Among his plays are *Die neuen Menschen* (1887); *Die Mutter* (1891); *Die häusliche Frau* (1893); *Der Apostel* (1901); *Der Krampus* (1902); *Der Meister* (1904); *Sanna* (1905); *Die Andere* (1905); *Das Konzert* (5th ed., 1909); *Die Kinder* (1911); *Das Prinzip* (1912). He also published the politico-controversial work, *Die Einsichtslosigkeit des Herrn Schaffle* (1886) and a volume of *Essays* (1912).

**BÄHR**, bâr, JOHANN CHRISTIAN FELIX (1798–1872). A German classical scholar, born at Darmstadt. He studied at Heidelberg, where he gained the favor and friendship of Creuzer, whose symbolic system of interpretation in mythological matters he himself pursued at a later period. He was elected a professor at Heidelberg in 1821. Previous to this he had occupied himself chiefly with the elucidation and criticism of Plutarch, the result of which was an annotated edition of *Alcibiades* (Heidelberg, 1822), and of his *Philopœmen, Flaminius, Pyrrhus* (Leipzig, 1826). At the same time he collected and published the fragments of Ctesias (1824). But a greater interest was excited by his *Geschichte der römischen Litteratur* (1828; 4th ed., 1868–70), which is noted for its clearness and comprehensiveness. Three supplements to this work also appeared: *Die christlichen Dichter und Geschichtschreiber Roms* (1836; 2d ed., 1872), *Die christliche-romische Theologie* (1837), and *Geschichte der römischen Litteratur im karolingischen Zeitalter* (1840). One of his most important works is his elaborate and learned edition of Herodotus (1832–35). In 1835 he published his *De Universitate Constantinopoli Quinto Sæculo Conditâ*. He likewise contributed numerous articles to Jahn's *Jahrbücher für Philologie* and kindred publications.

**BÄHR**, OTTO (1817–95). A German jurist, born at Fulda. He studied law and political science at Marburg, Göttingen, and Heidelberg, and in 1849 became justice of the Supreme Court of Cassel. For his defense of the constitution during the struggle of 1850 he was made justice of the Supreme Court at Fulda in 1851, but in 1856 he was recalled to Cassel and in 1863 was made a member of the Court of Appeals. In 1867 he became a member of the new Court of Appeals established at Berlin for Alsace-Lorraine and was elected to the Reichstag from the city of Cassel and to the Prussian House of Deputies. He became a justice in the Imperial Court at Leipzig in 1879, but retired in 1881 on account of ill health. His most important writings are a highly esteemed monograph entitled *Die Anerkennung als Verpflichtungsgrund* (1855) and a treatise on political philosophy, *Der Rechtsstaat* (1864). He was also author of the *Gesammelte Aufsätze* (2 vols., Leipzig, 1895).

**BAHRAICH**, bâ-rīch'. The name of a district in the division of Faizabad, united provinces of Agra and Oudh, British India, and of a town, capital of the district, situated at the foot of the Himalayas, 65 miles northeast of Lucknow (Map: India, D 3). Area of district, 2650 square miles; pop., 1891, 1,000,400; 1901, 1,051,850. The town, on the junction line from Gonda to Basti, began to flourish when the railroad was built and has a considerable trade. It manufactures fireworks and native cloth. Many thousands of pilgrims are attracted every year to the shrine of Masaud, a Mohammedan saint. Pop., 1901, 27,304; 1911, 26,907.

**BAHRAL**, bä'ral. See BURHEL.

**BAHRDT**, bärt, KARL FRIEDRICH (1741–92). A German theologian of the extreme skeptical school. He was born Aug. 25, 1741, at Bischofswerda, in Saxony, and studied at Leipzig, where he soon displayed extraordinary talents, together with some defects of character. His early theological writings betrayed the skeptical tendencies which were afterward more fully developed. On account of his immoral conduct he was, in 1768, compelled to leave Leipzig, where he had been a popular preacher and professor. In Erfurt, his next residence, he was appointed professor of philosophy and Hebrew antiquities, but gave offense by his rationalistic teaching as well as by his mode of life. He wrote *Briefe über die systematische Theologie* (2 parts, 1770–71), and *Wünsche eines stummen Patrioten* (1770), two works whose heterodoxy involved him in controversies and made his position untenable. In 1771 he went to Giessen, where he delivered theological lectures and preached with approbation. His translation of the New Testament (1773) was regarded as so heretical that the author was deprived of the privilege of teaching (1775). His creed, in fact, was simple deism, and one of the chief points in his theology was his rejection of miracles. Even the immortality of the soul was not positively maintained in his work. From 1775 to 1779 he was most of the time in great straits and compelled to earn his support as best he might; but in 1779 he became professor of philosophy at Halle and won enormous popularity. But he overworked himself and so resigned his professorship. When the Wöllner edict of 1788 against rationalism appeared, he ridiculed it anonymously, but was condemned to a year's imprisonment at Magdeburg. He employed his leisure in writing his autobiography, which is not noted for veracity (1790). Released, in 1790, he opened an inn at Halle, where he lived with a mistress. He then wrote the best book of the many he produced, *System der moralischen Religion* (1719). He died at Halle, April 23, 1792. For his biography consult J. Leyser, *F. Bahrdt, sein Verhältniss zum Philanthropismus und zur neuern Pädagogik* (2d ed., Neustadt, 1870).

**BAHREIN** (bä-rān') **ISLANDS** (Ar. *Bahrein*, two seas). A group of islands under British protection, situated in lat. 26° N. and long. 50° 40′ E., on the west side of the Persian Gulf, lying mostly within the bay northwest of the Katar Peninsula (Map: Asia, E 6). Total area, 230 square miles. The chief island, called Bahrein, or Aval, has a north and south extent of 25 miles and a greatest breadth east and west of 9 miles; and while having flat, sandy coasts, yet is hilly in the interior. The soil is generally fertile, and the frequency of springs permits the somewhat extensive growing of eastern tropical fruit, such as figs and dates, and

of grains, particularly wheat and barley. The pearl fisheries, on banks submerged from 50 to 200 feet below the sea level, and extending for a distance of nearly 125 miles along the shore, form an important industry. In the interior are found many curious mound tombs of considerable size. An excellent breed of donkeys is raised, and the only manufactures are mats and cloth made from fibre. There are about 100 villages in the islands, but only two cities of considerable size: Manama, the chief trading centre; and Moharek, the capital, each with a population of about 25,000 in 1912. These islands have long been important trading points. Pop., 1890, 68,000; 1912 (est.), 90,000.

**BAHR-EL-ASWAD.** See ATBARA.

**BAHR-EL-GHAZAL,** bär'el-gȧ-zäl' (Ar. the river of gazelles). A western tributary of the upper White Nile, which it joins in about 90° N. lat. Through its affluents (the Bahr-el-Arab and others) it collects all the waters flowing southeastward from the highland of Darfur; also those flowing north through the Bahr-el-Ghazal Province (Jur, Jalo, etc.) east of the water parting between the Nile and Congo basins. The slope of the river is so exceedingly gentle that the current is slow, swamps spread far and wide, and immense barriers of vegetation are formed that make navigation very difficult.

**BAIÆ,** bī'ē, now BAJA. A famous watering place of the ancient Romans, situated on a beautiful bay in Campania, west of Puteoli (now Pozzuoli) and north of Cape Miseno. It was renowned for its lovely climate and scenery, its warm sulphur springs, and its excellent sea food, especially the oysters of the neighboring Lucrine Lake. Many wealthy Romans had villas here, and the shore is dotted to-day with the remains of ancient houses, baths, and temples. Even under the republic Baiæ was notorious for its loose morals, and under the emperors life there was marked by extreme luxury and sensuality. With the decline of the Roman power Baiæ rapidly lost its importance, and was finally abandoned because of its malarious atmosphere. Recently it has attained some importance as a naval station.

**BAIER,** bī'ĕr, JOHANN WILHELM (1647–95). A Lutheran divine. His *Compendium Theologiæ Positivæ* (Jena, 1686; many ed., rep., St. Louis, Mo., 1882) was long the principal manual used by Lutheran divinity students.

**BAÏF,** bȧ'ĕf', JEAN ANTOINE DE (1532–89). A French poet, born at Venice. He was a member of the Pléiade (q.v.) and is perhaps best known for his unsuccessful attempt to introduce into French poetry the rhymeless verse (*vers mesurés*) of the ancients. For the promotion of this, and of a further design for the simplification of French orthography, he founded an "Académie de poésie et de musique" (1567–84). His *Poésies choisies* have been edited by Becq de Fouquières (1874), and his *Mimes, enseignements, et proverbs* by Blanchemain (1880). Consult Nagel, *Die metrischen Verse J. A. de Baïf* (Leipzig, 1878), and Mathieu Augé-Chiquet, *La rie, les idées et l'œuvre de Jean Antoine de Baif* (Paris, 1909).

**BAIKAL,** bī'käl' (Turk., Tatar *bai*, rich + *kal, kül*, lake, sea; Mongol, *Dalai-Nor*, holy sea). The third lake in point of size in Asia, and the largest fresh-water lake of the Continent; situated in the south of Siberia, in the government of Irkutsk, on the line of the Siberian Railway, in lat. 51° 28′ to 55° 50′ N., long. 103° 45′ to 110° 20′ E. (Map: Asia, K 3). It covers an area of 13,330 square miles and has a shore line of 1220 miles. Its length is 386 miles, and its breadth from 9 to 50 miles; height above the sea, 1587 feet; greatest depth, 5400 feet, making Baikal the deepest fresh-water lake of the world. The average depth is 820 feet, and the lake is divided by two areas of shallow water into three deep basins. Its waters are clear and transparent. The Baikal, Barguzin, and other mountains inclose the lake, which is fed by over 300 streams, the chief of which are the Selenga and Barguzin. Its outlet is by the lower Angara, a chief tributary of the Yenisei. Baikal has several islands, the largest of which is Olkhon. Petroleum wells, mineral and hot springs are found in the vicinity of the lake. Earthquakes occasionally occur. Baikal forms an important link in the chain of communication between Russia and China and has several commercial ports, the most important being Lisvinichnoe, whence the Angara carries its waters to the Yenisei. The Trans-Siberian Railway passes around its southern end. Of recent years steamboats have given a considerable impetus to its trade. Its sturgeon, salmon, and fresh-water seal fisheries are valuable, and large quantities of other fish are also taken. A peculiar fish, called the golomynka (*Comephorus baicalensis*), which is almost one mass of fat, yielding train oil, was at one time caught in immense numbers, but is now rather scarce. The surface of the lake is frozen from November to April, but traffic is carried on over the ice. Besides the Russians settled on the banks of the Selenga and Angara, the shores of Lake Baikal are also inhabited by tribes of the Buryats and Tunguses. Consult Drizhenko, "Exploration of Lake Baikal," in *Geographical Journal*, vol. ii (London, 1898); Woeikow, "Der Baikalsee," *Pet. Mitt.*, 56, Band, Heft. vi (1910).

**BAIKIE,** bā'kĭ, WILLIAM BALFOUR (1825–64). An English naturalist, traveler, and philologist. He was born at Kirkwall, Orkney, joined the British navy, and was made surgeon and naturalist to the Niger Expedition in 1854. The senior officer died before reaching Africa, and Baikie took command and explored the Niger for 250 miles. In 1857 he was sent on a second expedition, but his vessel was wrecked, and all his companions returned to England. He settled for a time, with none but native assistants, at the confluence of the Binue and the Niger. Within five years he opened the Niger to navigation, made roads, and established a market for the native trade. He studied and made vocabularies of nearly 50 native dialects, and translated into Haussa portions of the Bible and Prayer Book. He published *List of Books and Manuscripts Relating to Orkney* (with Kirkwall, 1847), *Historia Naturalis Orcadensis Zoology* (with R. Heddle, 1848), and *Observations on the Haussa and Fulfulde Languages* (1861).

**BAIKTASHI,** bīk-tä'shē, or **BEKTASCHI.** A mendicant order of dervishes (q.v.), which had its origin in the fourteenth century. It takes its name from Hadji Bektasch, a Mohammedan saint. It was he who christened the newly constituted troops of Murad I the Janizaries. Shortly after this the Bektaschi sprang up and from their common patron were associated with the troop until its destruction. The order was abolished in 1826.

**BAIL** (OF. *bailler*, to carry, give, deliver,

from Lat. *baiulare*, to carry a burden, from *baiulus*, porter, carrier). The delivering up of a person under arrest, or against whom personal proceedings have been instituted, to accepted sureties who give security for his appearance at the proper time before the court, or for his carrying out the judgment of the court. The form of this security is usually a bond executed by the sureties, or a recognizance (q.v.) acknowledged by them. The term "bail" is also commonly applied as well to the security given and to the persons who give the security.

Bail may be required either in a criminal or a civil case, but in the latter only when the *person* of a defaulting debtor is proceeded against. With the modern changes of the laws with respect to the arrest and confinement of a debtor, the applicability of bail in civil cases has very greatly decreased. A person who has been bailed is placed in the custody of the surety who gives bail for him. He may therefore be arrested by the surety at any time and surrendered to the court, and when this is done the responsibility of the surety at once ceases. The surety is bound to produce his principal at the specified time unless prevented by the sickness, death, or legal imprisonment of the principal. In obtaining possession of the person of the principal, the surety has the right to call upon the sheriff or other law officers to assist him. An accused person entitled to bail has a right to demand the privilege at any time between the arrest and the final judgment of the court. The responsibility of the surety ceases upon the appearance in court of the principal at the proper time. If he does not so appear, the bond given as security may at once be declared forfeited by the court; whereupon execution may issue as for any judgment, and collection may be made forthwith. Under the common law bail could not be demanded in cases of felony. By statute law in Great Britain, and now universally in the United States, however, bail can be demanded in all cases except those of capital offenses. Considerable discretion is left to the magistrate as to whether an offense may or may not be such as properly to admit of bail. Thus, where an assault has been committed under such circumstances as to make it murder if the injured person should die, and where there is reasonable probability that death may ensue, a magistrate in any of our States would refuse to accept bail.

Generally speaking, in the United States the common law is closely followed in the regulation of bail. The English Bill of Rights (1 Will. and M. 2, chap. 2), the Constitution of the United States (Amdts., Art. VIII) and those of the several States prescribe that excessive bail shall not be demanded. What excessive bail may be is generally left to the determination of the court, though the criminal codes of many States specify a minimum sum for each class of offenses against the law, a lower amount than which shall not be accepted as security in such cases. A *bail piece* was originally a certificate issued to the surety attesting his act of offering bail; at present it generally signifies a warrant issued to the surety upon which he may arrest the person for whom bail has been taken. The term *straw bail* is a familiar designation of bail offered by persons not possessing the requisite financial responsibility, but willing to swear that they do possess it. The term is said to have originated in the fact that in the English bankruptcy courts such rascals were always in waiting in the outer halls, and that it was their custom to carry straw fastened on the shoe to signify the kind of service they were willing to render. At the present day, in civil cases, bail cannot be required unless there is some allegation of fraud involved, such as that the defendant is suspected of the design of putting property out of the reach of the court, or where he is arrested in a debt proceeding, and affidavit is made that he is about to leave the State, or where a tort or personal injury of a malicious kind is alleged. The old distinction in civil cases between common bail (or bail below) and special bail (bail above or bail to the action) is, therefore, not now of such consequence as formerly. Common bail, or bail below, was in effect an undertaking that the defendant would appear before the court at the day and place named in the process; special bail was a more general undertaking, entered into after such appearance had been made, that the defendant should satisfy the judgment of the court in damages, debt, or costs, or, failing to do so, should surrender his person to the court. The statutes of the States and the practice of the courts usually require persons giving bail to be possessed of real estate or property not easily removable from the jurisdiction of the court. In admiralty bail is often required, in actions *in rem*, to procure the discharge of the property proceeded against. The bail is in the form of a stipulation, by which the owner of the seized property and his sureties undertake to pay and perform the final decree in the case. Consult the authorities referred to under PRACTICE.

**BAILÉN**, bī-lān'. A town in the province of Jaen, Spain, 20 miles north of Jaen (Map: Spain, D 3). It is celebrated as the place where, in July, 1808, the French general, Dupont, capitulated, surrendering 18,000 men to the Spaniards under Castaños—the first great disaster to the French arms in the Peninsular War. Galena and zinc blende are mined in the vicinity. Pop., 1900, 7420; 1910, 8334. Consult Galdós, "Bailén," in *Episodios nacionales*, vol. ii (Madrid, 1882).

**BAILEY**, bā'lĭ (OF. *baile*, ML. *ballium* = Lat. *vallum*, wall = a court). Originally the bailey was any outer line of defense; then, more specifically, the wall of the outer court of a feudal castle, or any of its inner walls of defense. Hence it came to mean the whole space inclosed within these walls, except that covered by the keep. (See CASTLE.) With the development of feudal architecture there were several distinct courts, with their buildings and embattled walls, and each was called a bailey. Thus, there were the outer, the middle, and the inner baileys. The entrance to the outer bailey was by a drawbridge over the moat and through a strong gate; it was often defended by a barbican (q.v.), and precautions were also taken to defend the inner baileys. Each bailey had its special function. (See CASTLE; GOTHIC ARCHITECTURE.) In towns the bailey meant the entire space inclosed within the walls, or *vallum*, and was used in connection with civil and criminal jurisdiction; hence the Old Bailey in London and the Bailey in Oxford. In France the governor of a town was long called a *bailli*, and his subordinates were bailiffs.

**BAILEY**, FLORENCE MERRIAM (1863– ). An American writer on ornithology. She was born at Locust Grove, N. Y., studied at Smith

College, Northampton, Mass., and began writing of bird life in the intimate fashion made so popular by the essays of John Burroughs. Her *Birds Through an Opera Glass* (1889) directed attention to that method of observation. She also published *A-Birding on a Bronco* (1896), *Birds of Village and Field* (1898), and *Handbook of Birds of the Western United States* (1902).

**BAILEY,** GAMALIEL (1807–59). An American journalist, prominent in the antislavery conflict. He was born at Mount Holly, N. J., the son of a Methodist preacher; graduated at the Jefferson Medical College, Philadelphia, in 1827; and for several months, after 1829, was the editor, at Baltimore, of *The Methodist Protestant*, the short-lived official organ of a radical offshoot of the Methodist Episcopal church. He went to Cincinnati in 1831, and was physician in the cholera hospital during the great cholera epidemic of that year. Converted to Abolitionism through the famous Lane Seminary debates of 1834, he thereafter took an active part in the anti-slavery conflict, and in 1836 assisted James G. Birney (q.v.) in establishing a weekly antislavery paper, *The Cincinnati Philanthropist*, of which he became proprietor and editor-in-chief in September, 1837. His press was repeatedly destroyed by mobs, and his life was often threatened, but he nevertheless continued his work until 1847 and after 1843 was editor also of a daily paper, *The Herald*, likewise established by himself. In 1847 he removed to Washington and became the editor of a newly established antislavery paper, *The National Era*, which under his management attained a wide circulation, exerted a powerful influence, and came to be regarded in many quarters as the central organ of Abolitionism. To this paper Mrs. Stowe, Whittier, Amos A. Phelps, and Mrs. Southworth were regular contributors, and it was in it that, in 1852, Mrs. Stowe's *Uncle Tom's Cabin* first appeared. In 1848 the *Era* office was besieged for three days by a proslavery mob, which finally dispersed under the influence of an eloquent address by Dr. Bailey. Consult an article, "A Pioneer Editor," in *The Atlantic Monthly*, vol. xvii (Boston, 1866).

**BAILEY,** JACOB WHITMAN (1811–57). An American naturalist, known as the pioneer in microscopic research in America. He was born at Auburn, Mass., and in 1832 graduated at West Point, where, after 1834, he was successively assistant professor, acting professor, and professor of chemistry, mineralogy, and geology. He devised various improvements in the construction of the microscope and made an extensive collection of microscopic objects and of algæ, which he left to the Boston Society of Natural History. In 1857 he was president of the American Association for the Advancement of Science. He wrote many articles on scientific subjects for the *American Journal of Science* and for scientific societies, a report on the infusorial fossils of California, and a valuable volume of *Microscopical Sketches*, containing more than 3000 original figures. A sketch of his life is given in the *American Journal of Science and Arts*, vol. XXV (New Haven, 1847).

**BAILEY,** JAMES MONTGOMERY (1841–94). An American journalist who won an ephemeral popularity as the "*Danbury News* Man." He was born at Albany, N. Y., and, after receiving a common-school education, learned the trade of a carpenter. He removed to Danbury, Conn., in 1860, and worked at his trade for the two following years, but found time to write occasionally for the newspapers. During the Civil War he served in the Seventeenth Connecticut Volunteers. In 1870 he established the *Danbury News*, for which he wrote the humorous sketches, sometimes original, often simply descriptive of commonplace happenings, which won for him a national reputation and made his paper known throughout the country. His first book, *Life in Danbury*, was published in 1873; it consisted of selections from his newspaper articles. His other publications were *The Danbury News Man's Almanac* (1873), *They All Do It* (1877), *England from a Back Window* (1878), *Mr. Phillips's Goneness* (1879), and *The Danbury Boom; with a Full Account of Mrs. Cobleigh's Action Therein* (1880).

**BAILEY,** JOSEPH (1827–67). An American soldier, born in Salem, Ohio. He entered the Federal army as captain in 1861, in 1862 was appointed acting engineer of the New Orleans defenses, and in 1863 was promoted to be lieutenant-colonel. When, in 1864, the Red River was found too shallow for the passage of Admiral Porter's gunboats, Bailey, in face of opposition from the engineers, superintended the construction of dams which deepened the water in mid-channel and thus permitted the vessels to descend. He was promoted to be brigadier-general in 1864, resigned from the army in 1865, and, having removed to Missouri, was killed there while performing his duties as sheriff.

**BAILEY,** JOSEPH WELDON (1863– ). An American legislator, born in Copiah Co., Miss. He was admitted to the bar in 1883 and within a few years was brought into prominence by his interest in politics. Here his unusual ability as a speaker appeared at once. In 1888 Bailey, having removed in the meantime to Gainesville, Tex., was a presidential elector-at-large. Elected to the House of Representatives in 1891, he was continued there for 10 years, at the end of which time he was chosen to the United States Senate. He was reëlected Senator in 1907 for the term ending 1913, and in the latter year was not again a candidate. Senator Bailey gained a reputation during his period of service as one of the most conspicuous and picturesque figures in the Senate and as one of the most eloquently persuasive orators ever a member of that body. Identified with the conservative wing of the Democratic party, and a deep student of constitutional law, he was particularly opposed to "free" interpretations of the Constitution. While in the House and during his earlier years in the Senate he was noted for aggressiveness in debate, but later on he was less frequently heard from the floor. In 1911, on account of the action of Democratic Senators in voting to accept the radical constitution passed by the voters of Arizona, Senator Bailey handed in his resignation to the Governor of Texas. This he later withdrew, announcing, however, in 1912, that he would not be a candidate for reëlection, but would retire to the practice of law. His last speech in the Senate was a remarkable attack on the initiative, referendum, and recall, and all similar devices for bringing about so-called reforms in the State and national governments.

**BAILEY,** LIBERTY HYDE (1858– ). An American horticulturist and botanist, rural sociologist, and agricultural educator. He was born at South Haven, Mich., graduated at Michi-

gan Agricultural College in 1882, and became professor of horticulture and landscape gardening in that institution, 1883. He was appointed to the chair of general and experimental horticulture at Cornell University in 1888–1903, when he became dean of the College of Agriculture and director of the experiment station there until his retirement in 1913. He made numerous important investigations in the science and practice of horticulture, rural economics and sociology, agricultural education, and general rural questions. He served as chairman of the Roosevelt Commission on Country Life in 1908–09. He has published a large number of scientific and popular works, contributed largely to technical journals and popular magazines, and written numerous poems on country life. He edited *The Cyclopedia of American Agriculture* (1907–09), the *Cyclopedia of American Horticulture* (1900–02), and the *Rural Science, Rural Textbook, Gardencraft,* and *Young Folks' Library* series of manuals. He was also author of much of this material and of many other works, notably *The Principles of Fruit-Growing* (1897); *The Nursery Book* (1897); *Plant-Breeding* (1897); *Sketch of the Evolution of our Native Fruits* (1898); *Principles of Agriculture* (1898); *The State and the Farmer* (1908); *The Nature Study Idea* (1909); *The Training of Farmers* (1909); *Manual of Gardening* (1910); *The Outlook to Nature* (1911); *The Country Life Movement* (1911); *The Practical Garden Book* (1913).

**BAILEY,** NATHAN or NATHANIEL (?–1742). An English lexicographer. He published *An Universal Etymological English Dictionary* in 1721, adding a supplementary volume in 1727. This work was so popular that by 1802 it had reached its thirtieth edition, and Johnson made a liberal use of it in preparing his own dictionary. Among Bailey's other works is *The Antiquities of London and Westminster* (1726). In 1883 the English Dialect Society reprinted the eighteenth-century dialect words preserved in Bailey's dictionary. This work was one of the sources from which Chatterton drew his pseudo Old English words.

**BAILEY,** PHILIP JAMES (1816–1902). An English poet, born at Basford, Nottingham. He studied at the University of Glasgow and was called to the English bar in 1840, but never practiced. His first poem, *Festus,* begun before he was 20 years old, was published in 1839. It was received with great enthusiasm, its author being classed by many critics of the day with Shakespeare and Milton. This extravagant estimate was naturally succeeded by a reaction, and for many years *Festus* was practically forgotten. In 1900, however, a renewed interest was manifested in it, and something like a fair critical estimate of the poem was made. *Festus* does, in fact, contain many passages of great power, and its language is often striking and majestic. On the other hand, it is excessively rhetorical; and this defect gives, upon a second reading, the impression of artifice and insincerity, while some of its best lines are really variants of Shakespearean originals. It was followed by *The Angel World* (1850), *The Mystic* (1855), and *The Universal Hymn* (1867), all of which have since been made a part of *Festus.* Bailey also published *The Age,* a satire (1858). Consult the eleventh or Jubilee edition of *Festus* (London, 1889). See ENGLISH POETRY, SPASMODIC SCHOOL OF.

**BAILEY,** SAMUEL (1791–1870). An English writer on politics, political economy, philosophy, and criticism. He became a banker and at his death left £90,000 to his native town, Sheffield. His writings generally are distinguished by independent thinking, logical precision, and warm aspirations for the improvement of mankind. His treatises on the mind, while abounding in original suggestions, expand and enforce the views of the school of Locke in metaphysics and what is termed the doctrine of utility in morals. Among his works the following may be mentioned: *A Critical Dissertation on the Nature, Measures, and Causes of Value* (1825); *The Right of Primogeniture Examined* (1837); *Letters on the Philosophy of the Human Mind* (3 series, 1855, 1858, 1863); and *The Received Text of Shakespeare's Dramatic Writings and its Improvement* (1861–62).

**BAILEY,** SOLON IRVING (1854– ). An American astronomer, born at Lisbon, N. H. He graduated in 1881 at Boston University and was subsequently appointed associate professor of astronomy at Harvard. In 1889 he established at Arequipa, Peru, a southern station of the Harvard Observatory, and in 1893, on the summit of Mount Misti at an elevation of 19,000 feet, the most loftily situated scientific station in the world. During 1908–09 he made astronomical observations and an investigation of climatic conditions in South Africa. Papers by him are to be found in the *Annals* of the Harvard Observatory. In addition, he published: *A Discussion of Variable Stars in the Cluster ω Centauri* (1902); an extensive work, *Peruvian Meteorology* (1902); *Recent Total Eclipses of the Sun* (1902).

**BAILEY,** THEODORUS (1805–77). An American naval officer, born in Chateaugay, N. Y. He entered the navy in 1818, became lieutenant in 1827, was commissioned commander in 1849 and captain in 1855, and in 1861 was assigned to the command of the *Colorado* in the blockade of Pensacola. In 1862 he was second in command of the fleet sent under Farragut against New Orleans. He led the attack upon the forts and was dispatched by Farragut to demand the surrender of the city. He was promoted in the same year to be commodore, and was appointed commander of the Eastern Gulf blockading squadron, in which post it is said that in 18 months he captured more than 150 blockade runners. After the war he was commandant at the Portsmouth (N. H.) Navy Yard and in 1866 was retired with rank of rear-admiral.

**BAILEY PEONAGE CASE.** See ALABAMA, *History.*

**BAILIE** (Scotch for *bailiff*). A superior officer or magistrate of a municipal corporation in Scotland, with judicial authority within the city or burgh. In royal burghs the office is in some respects analogous to that of alderman in England. The chief magistrate of a Scotch corporation, called the provost (q.v.), and often one or more of the bailies, are, by virtue of their office, in the commission of the peace. There are also *bailies of regality* and *barony,* who are appointed by the superior or overlord of the manor (q.v.), with limited powers. There is a bailie for the sanctuary or abbey of Holyrood, appointed by the Duke of Hamilton as hereditary keeper and having jurisdiction within the precincts. See BAILIFF.

**BAILIFF** (OF. *bailiff,* Fr. *bailli,* administrator, Low Lat. *bailivus,* from *baiulus,* carrier,

one who carries burdens, takes charge of). An officer exercising superintendence on behalf of some superior authority. Through all the changes of application the word has undergone in the course of history, it has denoted an overseer of some kind. At the Greek Imperial court in Constantinople, the chief tutor of the Imperial children was called *baiulus*. The same title seems also to have been given in Constantinople to the superintendent of the foreign merchants, who was appointed by the Venetians, and it may possibly be for this reason that the title *balio* came at length to be applied also to the Venetian ambassadors themselves. In France, the royal *baillis* were at one time commanders of the troops, administrators of the royal domains, and judges, each one in his district. Under the feudal system in England lords of manors or of the larger territorial units known as liberties or hundreds, enjoyed usually the right of administering justice in their domains and, as an incident of their jurisdiction, appointed bailiffs to superintend their courts of justice. As very little knowledge was required for these situations, and as they might be purchased, they were held in little estimation; and in later times, the bailiffs became standing characters on the stage, held up to ridicule on account of their ignorance and absurd pretensions. In some instances, however, the office of bailiff has been preserved in England as an office of dignity and authority, corresponding to that of sheriff, as in the case of the Bailiff of Dover Castle.

In modern English law the term "bailiff" means: (*a*) a superior servant or agent, in which sense the term is synonymous with *steward* or *factor;* and (*b*) an officer of the court, a tipstaff, a sheriff's officer or deputy. Its first application is to a person employed in the administration and charge of lands, goods, or chattels. The bailiff is liable in an action of account for the profits which he has made, or which he might, by proper industry and care, have made.

In the second sense in the English law bailiffs may be either officers appointed by the judges of certain courts, or, in more modern times, officers appointed over their respective districts by the sheriff to perform certain duties, including the service of process of arrest, collection of fines, and summoning of juries. The sheriff being answerable for their misdemeanors, bailiffs are usually bound in an obligation with sureties for the due execution of their office, and are then called *bound bailiffs. Special bailiffs* are officers appointed by the sheriff on the application of a party in a civil suit for some particular purpose, and the sheriff is not held responsible for their acts in this regard. In the United States the term "bailiff" is seldom used, the corresponding officer being the deputy or undersheriff. Deputies are of two classes: (1) general deputies, or those who by virtue of their appointment have authority to execute all the ordinary duties pertaining to the sheriff's office; and (2) special deputies, or officers *pro hac vice,* to execute particular processes for a special purpose. See SHERIFF.

**BAILIFF'S DAUGHTER OF ISLINGTON,** iz'ling-ton, THE. An old ballad in Bishop Percy's *Reliques of Ancient English Poetry.* The heroine, after dismissing her lover, finds him seven years later in London.

**BAILIWICK** (*bailiff, bailie* + *wick,* AS. *wic,* village, from Lat. *vicus,* village). In English law, the district within which a sheriff may exercise jurisdiction. Thus bailiwick is generally synonymous with county, and as such includes the limits within which a sheriff's deputies may execute process. The term is said by Blackstone to have been introduced into England by the Normans "in imitation of the French, whose territory is divided into bailiwicks, as that of England into counties." The term is not in use in the United States. See BAILIFF; SHERIFF.

**BAILLARGER,** bä'yär'zhā', JULES GABRIEL FRANÇOIS (1809–91). A French physician; born at Montbazon (Indre-et-Loire). He devoted himself principally to mental disorders, and in 1842 obtained a prize from the Academy of Medicine for his admirable essay entitled *Des hallucinations, des causes qui les produisent et des maladies qu'elles caractérisent,* published in vol. xiii of the *Mémoires* of the society. In association with Longet and Cerise, he founded in 1843 a review especially devoted to the study of nervous affections and mental diseases, under the title *Annales médico-psychologiques du système nerveux.* In recognition of his splendid services during the second outbreak of the cholera in 1849, Baillarger was decorated with the medal of the Legion of Honor.

**BAILLET,** bä'yā', ADRIEN (1649–1706). A French scholar and critic, born at Neuville-au-Hez, Beauvois, and educated there. In 1676 he was ordained to the priesthood, and in 1680 he became librarian to the advocate-general. His principal work is *Jugements des savants sur les principaux ouvrages des auteurs* (9 vols., 1685–86). He also wrote *Des satires personelles* (2 vols., 1689); *Vie de Descartes* (2 vols., 1691); *Les vies des saints* (3 vols., 1701).

**BAILLEUL,** bä'yēl'. The chief town of a canton, arrondissement of Hazebrouck, in the department of Nord, France, 46½ miles southeast of Calais by rail (Map: France, N., H 2). It is picturesquely situated on rising ground north of the river Lys, near the Belgian frontier. It is a quaint town of Flemish origin; the church of Saint-Vaast dates from the fourteenth century, and the Hôtel-de-Ville from the fifteenth; there is a museum of antiquities and paintings. Handmade lace is the chief industry, but the town has also manufactures of woolens, leather, brandy, and pottery. Pop., 1896, 13,450; 1901, 11,899; 1906, 13,573; 1911, 13,251.

**BAILLIE,** LADY GRIZEL (1665–1746). A Scottish poet, born in Berwickshire. She was the daughter of the Scottish patriot, Sir Patrick Hume, afterward first Earl of Marchmont, and in 1684 supplied him with food during his concealment in the vault beneath Polwarth Church. She shared her father's exile in Utrecht (1686–88). In 1692 she married the son of Robert Baillie, of Jerviswood. Some ballads written by her are preserved in Allan Ramsay's *Tea-Table Miscellany* (1724–27). The best known of them is "And Were na my Heart Licht, I wad Dee."

**BAILLIE,** HARRY. The shrewd proprietor of the Tabard Inn, in Chaucer's *Canterbury Tales.* It is in his hostelry that the pilgrims pass the first night of their journey, and in the morning he decides to continue on the road with them. He acts as the toastmaster of this literary feast, linking the different tales together by his little prefatory speeches.

**BAILLIE,** JOANNA (1762–1851). A Scottish

dramatist and poet born Sept. 11, 1762, at Bothwell, in Lanarkshire. In 1784 she went to reside in London, where her brother was a physician. Here and in Hampstead she remained till her death, Feb. 23, 1851. Through her long life she enjoyed a large share of the esteem and affection of her literary contemporaries. Her greatest achievement is undoubtedly the *Plays on the Passions*, which, though erroneous in conception, are full of noble and impressive poetry, and often display intense dramatic power. The principle upon which Miss Baillie proceeded in the construction of these plays was to take as the subject of each some passion, like hate, love, fear, or remorse, and to exhibit its influence on a character supposed to be actuated by nothing else. The leading personages of Miss Baillie's plays are, therefore, rather personifications of certain elements of human nature than genuine human beings. Still, there are scenes, in her tragedies especially, where the interest of the reader is intensely excited by the great art shown in her minute delineation of a particular passion, and where he is forced to forget the artificial theory underlying it. The first volume of the *Plays on the Passions* appeared in 1798 and met with remarkable success. Four years afterward she published a second volume; in 1804, *Miscellaneous Plays;* in 1812, the third volume of her *Plays on the Passions;* and in 1836, three volumes of dramatic poetry. The most popular, as well as the most powerful of her works, is the tragedy of *De Montfort*. It was performed in London, when Charles Kemble acted for 11 nights the character of the hero. Many of Miss Baillie's minor pieces are very sweet, simple, and beautiful; some of them are humorous ballads and poems in the Scottish dialect. Consult Baillie, *Dramatic and Poetical Works* (London, 1851), and Thackeray-Ritchie, *Book of Sibyls* (London, 1883).

**BAILLIE**, Matthew (1761–1823). A Scottish anatomist, born in Lanarkshire. He received his education at the universities of Glasgow and Oxford and subsequently continued his anatomical studies in London. In 1795 he published a small work entitled *The Morbid Anatomy of Some of the Most Important Parts of the Human Body*, which had a remarkable influence on the study of medicine and excited a spirit of careful induction among professional men. In 1799 Baillie relinquished his anatomical lectureship, in 1800 his position at St. George's Hospital, and after 1810 he acted as physician to the King.

**BAILLIE**, Robert (1599–1662). A Scottish Presbyterian clergyman. He was born at Glasgow and was educated in its university. In 1622 he was episcopally ordained, and (1631) was settled in Kilwinning. In 1640 he was one of the commissioners to go to London to prepare charges against Archbishop Laud. In 1642 he was appointed first professor of divinity at Glasgow; in the next year he sat as a commissioner in the Westminster Assembly of Divines and there asserted the divine right of presbytery as intolerantly as the churchmen had asserted the divine right of episcopacy. In 1649 he was one of the delegation sent to Holland to ask Charles II to accept the covenant and crown of Scotland. In 1661 he was made principal of Glasgow University. He died there in July, 1662. He was one of the most learned and accomplished of the Scottish clergy. His *Letters and Journals* (1637–62, best ed. by David Laing, 3 vols., Edinburgh, 1841–42) is a valuable contribution to knowledge of the times.

**BAILLIE-GROHMAN**, William Arthur (1851– ). An English sportsman and author. He was educated in England and on the Continent, had wide experience in the pursuit of big game, and as a rifle shot won about 70 prizes in America and Europe. His collection of prints and books pertaining to the chase is considered valuable. He was appointed a justice of the peace in British Columbia and published *Tyrol and the Tyrolese* (1876), *Sport in the Alps* (1896), *Sport and Life in North America* (1900), and other similar works.

**BAILLIE OF JERVISWOOD**, Robert (?–1684). A Scottish patriot and martyr to the cause of civic liberty. He was a native of Lanarkshire and came into prominence in 1676 by opposing the tyranny of the Duke of Lauderdale, the favorite of Charles II, in the illegal arrest of a relative. By means of an antedated warrant Baillie himself was thrown into prison and, indignantly refusing to pay the fine inflicted, was kept there four months, but was finally released on paying one-half of the amount demanded. After this he was a marked man and on the discovery of the Rye House Plot was arrested on no stronger evidence than certain letters, really of a non-compromising character, to the leaders of the Puritan party in London. He was kept in prison 20 months and became seriously ill. At last, in a dying condition, he was brought before the High Court in Edinburgh on a charge of treason, and although no valid evidence was presented to show his complicity in the plot, was adjudged guilty on the morning of Dec. 24, 1684, and barbarously hanged the same afternoon. His bearing throughout was dignified and heroic, and he has been called the "Scottish Algernon Sidney." His son married the poet Lady Grizel Baillie (q.v.). Consult *The Tryal and Process of High Treson and Doom of Forfaulture Against Mr. Robert Baillie of Jerviswood, Traitor* (London, 1685).

**BAILLOT**, bå'yō', Pierre Marie François de Sales (1771–1842). A French violinist and composer. He was born at Passy and died at Paris. After receiving his musical education in Paris and Rome, he appeared in public in 1791, and in 1795 became professor of the violin in the Paris Conservatoire, which post he held until his death. He studied harmony and counterpoint under Catel and Cherubini, became a member of Napoleon's private orchestra in 1802, traveled in Russia in 1805–08, and in 1814 organized chamber-music concerts in Paris, which gained him reputation as a quartette player. In 1815–16 he made a tour in Holland, Belgium, and England, and became a member of the London Philharmonic Society. He was director of the orchestra at the Paris Opera in 1821–31, of the Concerts Spirituels in 1822–24, and of the Royal Orchestra in 1825. Baillot was the last great representative of the classical school of violin playing in Paris; he was famous as a teacher, and his *Méthode du violon*, adopted by the Conservatoire, was considered by Fétis one of the best works of its kind. His compositions are difficult and are almost forgotten. Consult Wasielewski, *Die Violine und ihre Meister* (Leipzig, 1893).

**BAILLY**, bå'yē', Antoine Nicolas (1810–92). A French architect, born in Paris. He executed various works as diocesan architect at Bourges, Valence, and Digne, and after 1860

erected in Paris the Lycée St. Louis and his most famous work, the Tribunal de Commerce. He was the first president of the Société des Artistes Françaises and an officer of the Legion of Honor.

**BAILLY**, JEAN SYLVAIN (1736–93). A French savant. He was born in Paris. Originally intended by his father to be an artist, he first turned aside into literature, until, becoming acquainted with Lacaille, he was induced to study astronomy, which proved to be the true sphere of his genius. In 1763 he presented to the Académie des Sciences his *Lunar Observations;* in 1766 appeared his *Essai sur la théorie des satellites de Jupiter*, and in 1771 a treatise on the light of these satellites. His historico-scientific works, *Histoire de l'astronomie ancienne* (1775), *Histoire de l'astronomie moderne* (3 vols., 1779–82), *Traité de l'astronomie indienne et orientale* (1787), are full of learning and ingenious disquisition and written with great elegance. In 1777 he published his *Lettres au l'origine des sciences*, and in 1779 his *Lettres sur l'Atlantide de Platon.* In 1784 he was elected a member of the Académie Française and in the following year of the Académie des Inscriptions. The *éloges* which he wrote about this period for the Académie des Sciences, viz., those on Charles V, Molière, Corneille, Lacaille, Leibnitz, Cook, and Gresset, were very highly praised. The Revolution interrupted his peaceful studies. During the earlier part of it he occupied a very prominent position. Elected president of the National Assembly, June 17, 1789, and mayor of Paris on the 15th of July, he conducted himself in these capacities with great integrity and purity of purpose; but at last lost his popularity by allowing the National Guard to fire on the masses who were assembled in the Champs de Mars, on the 17th of July, 1791, to demand the dethronement of the King. He now threw up his mayoralty, considering it impossible to satisfy either party, withdrew altogether from public affairs, and went to live first at Nantes, and afterward with his friend Laplace at Melun. Here he was seized by the Jacobin soldiery and brought to Paris, where he was accused of being a conspirator and was executed Nov. 12, 1793. Among his papers were found, and afterward published, an *Essai sur l'origine des fables et des religions anciennes* (1799), and *Mémoires d'un témoin oculaire de la Révolution* (1804). Consult Arago, *Biographie de Jean Sylvain Bailly* (1853) and Nourrisson, *Trois Révolutionaires: Turgot, Necker, Bailly* (1885).

**BAILMENT** (for derivation, see BAIL). A delivery of personal property by one party to another, to be held for the purpose and according to the terms of the delivery, and returned or delivered over when that purpose is accomplished. The party delivering the chattel is termed the *bailor;* the recipient, the *bailee.* A bailment is distinguished from a sale in that the identical thing delivered is to be restored in the same or an altered form and not its value in money or in a substituted article, and from a mortgage by the fact that in bailment there is no transfer of title. But so important is possession at the common law that the ownership is deemed to be divided between the bailor and bailee, the latter being said to have the "special property" in the bailed article, while the interest of the owner, sometimes described, by analogy to the law of real property, as a reversionary interest, is known as the "general property" therein. Bailments are generally divided into three classes, formerly designated by terms derived from the civil law: (1) that for the sole benefit of the bailor or the party whom he represents; (2) that for the sole benefit of the bailee or the party whom he represents; (3) that for the benefit of both parties. Familiar instances of bailment are the lending or hiring out of chattels, lien or the right to detain a chattel to enforce the payment of charges thereon, pledge or pawn and the custody of goods by an innkeeper or common carrier. As the common law is mainly concerned to protect possession, it is the bailee and not the owner of a chattel who is entitled to maintain the ordinary actions, such as trespass, trover, and replevin, for an interference with the bailed article while in the bailee's possession, although for a permanent injury done to the chattel, the bailor may prosecute a special action for the inquiry to his reversionary interest. The wilful destruction of the bailed article by the bailee or any unauthorized use thereof by him amounts to a conversion (q.v.) and ipso facto puts an end to the bailment. The important question, however, of the law of bailments is the determination of the obligations and liabilities of the respective parties in their several relationships. Thus, when the bailment is for the bailor's sole benefit, the bailee is required to exercise but slight care and is responsible only for gross negligence; but when wholly for the bailee's benefit, as a gratuitous loan, he must exercise the greatest care and is answerable for slight negligence; when the transaction is reciprocally beneficial to both parties, the bailee is required to exercise only ordinary care and is answerable only for ordinary neglect. It follows from this that a bailee, in the absence of special agreement, is not an insurer of the chattel placed in his hands and is not responsible for losses or damages necessarily incident to the purpose of the bailment; but he is liable for the violation of the obligation imposed by the terms of the contract, or for the misappropriation of the chattel or the misdirection of its use. By the common law an exception is made in the case of innkeepers and common carriers who are absolutely liable for the safe return of the goods intrusted to them, except from losses occurring by the act of God, the public enemy, or through the fault of the bailor. But this rule has been modified by statute in conformity with modern conditions, both in England and the United States; and the innkeeper may now, by providing a safe deposit and giving proper notice, require the guest to deposit his valuables, in default of which the innkeeper's liability does not exceed that of an ordinary bailee. It is also generally recognized that a common carrier's liability as an insurer against everything except the act of God or the public enemy may, by proper notice and fair and reasonable special contract, be reduced to exclude all losses and injuries except those resulting from his own or his servants' negligence. In the State of New York this doctrine is carried to the extent of permitting exception even from those damages resulting from his own negligence, but not from willful wrongdoing. The contract of a carrier of passengers is not a contract of bailment. Consult: Schouler, *Treatise on the Law of Bailments* (3d ed., Boston, 1897); Story, *Commentaries on the Law of Bailments* (9th ed., Bos-

ton, 1878); Beal, *Law of Bailments*, with notes to Canadian cases (London, 1900). See CARRIER, COMMON; INNKEEPER; LIEN; PLEDGE; MORTGAGE.

**BAILY**, EDWARD HODGES (1788–1867). An eminent English sculptor, particularly known for his portrait statues and busts, born at Bristol. In 1807 he entered the studio of Flaxman in London. He was made an associate of the Royal Academy in 1817 and a full member in 1821. The statue of Nelson in Trafalgar Square, London, is one of his finest works. His other sculptures include "Eve at the Fountain," "Hercules Casting Hylas into the Sea," "Psyche," "Eve Listening to the Voice."

**BAILY**, FRANCIS (1774–1844). An eminent English astronomer, born at Newbury. In the midst of active business as a London stockbroker, he laid the foundation of his scientific fame, and during the years of life usually devoted to repose, underwent labors and rendered services to astronomy which entitle him to be regarded as one of the most remarkable men of his time. Among the chief of these services were his share in the foundation of the Royal Astronomical Society and in the improvement of the *Nautical Almanac*, his laborious repetition of Cavendish's pendulum experiments and the production of the Royal Astronomical Society's star catalogue, based on a revision of the catalogues of Tobias Mayer, Halley, and the earlier astronomers. In 1842 he completed the reduction of Lalande's great catalogue for the British Association. He was elected a Fellow of the Royal Society in 1821 and was twice awarded the gold medal of the Royal Astronomical Society (1827 and 1843). He was also the first to describe fully the phenomenon known as Baily's beads, which is observed in connection with total eclipses of the sun. Just before the beginning and after the end of the obscuration of the sun by the moon's disk, the thin crescent-shaped unobscured portion of the sun seems to become suddenly discontinuous and looks like a belt of bright spots varying in size and separated by dark spaces. The resulting appearance may be compared to a string of beads. The phenomenon is the effect of irradiation and the inequalities of the moon's edge. In addition to an immense mass of contributions to the *Memoirs of the Royal Astronomical Society*, Baily wrote a valuable *Account of the Rev. John Flamsteed, the first Astronomer Royal* (1835), which gave rise to much discussion on the subject of that eminent man's connection with Newton. To the literature of life annuities, etc., he contributed several standard works, the chief of which are *The Doctrine of Interest and Annuities* (1808) and *The Doctrine of Life Annuities and Assurances* (1810). Consult Herschel, *Memoir of F. Baily, Esq.* (London, 1847).

**BAILY'S BEADS.** See BAILY, FRANCIS.

**BAIN**, bān, ALEXANDER (1818–1903). A Scottish psychologist. He was born at Aberdeen, Scotland, and studied at Marischal College from 1836 to 1840, obtaining the degree of M.A. He taught moral and natural philosophy at this institution from 1841 and 1845, and afterward became successively professor of natural philosophy at Anderson's University, Glasgow, assistant secretary to the Metropolitan Sanitary Commission from 1847 to 1855, secretary of the General Board of Health from 1848 to 1850, examiner in logic and moral philosophy at the University of London from 1857 to 1862, examiner in moral science for the India Civil Service from 1858 to 1860 and in 1863, professor of logic and English literature in the University of Aberdeen from 1860 to 1880, and lord rector of the University of Aberdeen in 1881. He received the degree of LL.D. from Edinburgh University in 1859. From the year 1840 Bain was a frequent contributor to the *Westminster Review* and Chambers's *Papers for the People* and *Information for the People*. In these publications he became well known both for his exceptionally apt popularizations and for his own researches in fields of applied science. But his enduring fame will be associated with his treatises on psychology. His best-known works are: *The Senses and the Intellect* (1855; 4th ed., 1894); *The Emotions and the Will* (1859; 4th ed., 1899); *The Study of Character* (1861); *Mental and Moral Science: A Compendium of Psychology and Ethics* (1868; 3d ed., 1872); *Logic, Deductive and Inductive* (1870, 1879); *The Relation of Mind and Body* (1873, 1897); *Education as a Science* (1879; 7th ed., 1889). Bain also edited Paley's *Moral Philosophy* (1852), published a biography of James Mill (1882), a criticism of J. S. Mill (1882), assisted in editing Grote's *Aristotle*, edited Grote's *Minor Works*, and wrote several authoritative works on composition and rhetoric.

Bain was a stanch empiricist, emphatically opposed to all transcendental and a priori methods of procedure. Following Hartley's lead, he sought to supply a physiological basis for all psychical facts. Perhaps the best characterization of his place in psychology is given by J. S. Mill in *Dissertations and Discussions* (1874): "Bain has stepped beyond all his predecessors and has produced an exposition of the mind of the school of Locke and Hartley . . . which deserves to take rank as the foremost of its class, and as marking the most advanced point which the *a posteriori* psychology has reached." "Those who have the highest appreciation and the warmest admiration of his predecessors are likely to be the most struck with the great advance which this treatise [*The Senses and Intellect*] constitutes over what those predecessors had done, and the improved position in which it places their theory." "With analytic powers comparable to those of his most distinguished predecessors, he combines a range of appropriate knowledge still wider than theirs; having made a more accurate study than perhaps any previous psychologist of the whole round of physical sciences." The most important modification made by Bain in the doctrine of association was the introduction of a new element in mental development—the tendency to spontaneous movement. "He holds that the brain does not act solely in obedience to impulses, but is also a self-acting instrument; that the nervous influence which . . . excites the muscles into action is generated automatically in the brain itself; not, of course, lawlessly and without a cause, but under the organic stimulus of nutrition." His work is marked by a spirit of precise analysis and zealous accuracy. It represents the high-water mark of English associationism. Consult: Mill, *Dissertations and Discussions* (New York, 1874); Ribot, *Contemporary English Psychology* (New York, 1873); articles in *Mind* (1904).

**BAIN**, ALEXANDER (1810–77). A Scottish electrician. He was born in Scotland, but in 1837 removed to London as a journeyman. Among his inventions were electrical clocks, an

earth-battery (1843), an apparatus for registering the progress made by ships (1844), the electro-chemical telegraph (1843), and an electrical apparatus for playing musical instruments at a distance.

**BAIN'BRIDGE.** A city, and the county-seat of Decatur Co., Ga., 235 miles west by south of Savannah, on the Atlantic Coast Line and the Georgia, Florida, and Alabama railroads, and on the Flint River (Map: Georgia, B 5). It is in a region producing cotton and tobacco and has brickyards, turpentine distilleries, iron-works, cotton oil mills, syrup refinery, etc. The city contains a Carnegie library and historic Fort Hughes, and owns its water works and electric light plant. Pop., 1900, 2641; 1910, 4217.

**BAIN'BRIDGE,** WILLIAM (1774–1833). An American naval officer. He was born at Princeton, N. J., entered the merchant marine at the age of 15, became captain of a merchantman four years later, and in 1796, while in command of the *Hope*, was attacked by and defeated an English schooner, whose captain had attempted to impress some of the *Hope's* crew. On the organization of the navy in 1798 he became a lieutenant, and was placed in command of the schooner *Retaliation*. Later in the year he was captured off Guadaloupe by the French frigates *Volontier* and *Insurgente*. Being released after several weeks, he returned to the United States and made a report which caused the passage of the "Retaliation Act" of 1798 against French subjects captured on the high seas. In March, 1800, he was raised to the rank of captain and later in the year was sent with tribute to the Dey of Algiers, who compelled him to convey an embassy, under Algerian colors, to Constantinople. He next served as commander of the *Philadelphia* in the war against Tripoli (1801–05), capturing the Mooiish frigate *Moshboha* (Aug. 26, 1803), but, running aground, he was himself captured in November, off Tripoli, where he and over 300 of his men were kept prisoners until the close of the war. Early in 1812 he was put in command, as commodore, of the *Constitution*, *Hornet*, and *Essex*, he himself being on the first; but soon afterward the three vessels parted company, and on December 29 the *Constitution* met and captured the British frigate *Java*. (See CONSTITUTION, THE.) In 1815 he was made commander of the squadron fitted out against Algiers, but the war was averted. In the same year he established in Boston the training school for naval officers and afterward for two years (1819–21) cruised in the Mediterranean. He subsequently served at the Philadelphia and Charlestown navy yards, and from 1832 to 1833 acted as chief of the board of naval commissioners. He was a tall and powerful man and was noted at once for his strong will and his remarkable tact. Consult Harris, *Life of Bainbridge* (Philadelphia, 1837), and Cooper, *Lives of Distinguished American Naval Officers* (2 vols., Auburn, 1846).

**BAINES,** bānz, EDWARD (1774–1848). An English publicist, born at Walton-le-Dale. He was apprenticed to a printer at Preston and afterward at Leeds and in 1801 bought the Leeds *Mercury*, which subsequently became one of the most important of the provincial newspapers. He was consulted on important questions by many parliamentary leaders and was elected, in 1834, to succeed Macaulay as a member for Leeds. Until 1841 he continued in Parliament as an independent Liberal. He advocated the separation of church and state and the reform of factory laws, and opposed governmental interference in educational matters. He of *Lancaster*, and a *History of the Reign of the County of York* (1823), later enlarged as the *History of the County Palatine and Duchy of Lancaster*, and a *History of the Reign of George III* (4 vols., 1823). Consult his *Life* by his son (1861).

**BAINES,** SIR EDWARD (1800–90). An English politician, son of the preceding. He was elected in 1859 to Parliament, where he became the champion of many reforms. He opposed church tests in the universities, sought the disestablishment of the Irish church, and in 1861 and 1864 presented bills for extending the electoral franchise. He wrote a *History of the Cotton Manufacture in Great Britain* (1835) and other works.

**BAINI,** bä-ē'nē, GIUSEPPE (1775–1844). A celebrated Italian composer, one of the most distinguished and scientific of modern times. He was born and died in Rome. A pupil of the Seminario Romano and later of Jannaconi, he entered the papal choir in 1795 and in 1814 succeeded Jannaconi as chapelmaster. His numerous church compositions are distinguished by religious austerity and severe classical profundity. His *Miserere* for 10 voices was the only work of the nineteenth century deemed worthy to be performed at the Sistine Chapel, alternately with those of Allegri and Bai, during Holy Week. His best title to fame, however, rests upon his life of Palestrina, *Memorie storico-critiche della vita e delle opere di Giovanni Pierluigi da Palestrina* (2 vols., Rome, 1828; German trans. by Kandler, with notes by Kiesewetter, 1834). It is the standard work on Palestrina, though strongly biased with regard to non-Italian composers.

**BAIOCCO.** See BAJOCCO.

**BAIRAKTAR,** bī'rāk-tär', or **BAIRAKDAR** ('standard-bearer'). The title of the energetic Grand Vizier, Mustapha (1755–1808). He was born of poor parents, but early distinguished himself by his bravery. He fought against the Russians as Pasha of Rustchuk in 1806. When Selim III was deposed by the Janizaries in 1807, Bairaktar took the part of the dethroned Sultan, and after the murder of Selim in 1808 he deposed his successor, Mustapha IV, and elevated Mustapha's brother, Mahmoud II, to the throne. Bairaktar was now appointed Grand Vizier. In the exercise of this office he deposed the Grand Mufti, the leader of the Janizaries, and all the ulemas who had taken any part in the late revolution; while at the same time he was careful to secure the tranquillity of the capital and strengthened the regular army. His chief object was the annihilation of the Janizaries, but, like the unfortunate Selim, he fell a victim to that fierce band of soldiery. Favored by the more fanatical among the people, the Janizaries rebelled and, with the support of the fleet, attacked the Seraglio on Nov. 15, 1808, and demanded the restoration of Mustapha. Bairaktar defended himself bravely, but when he saw that the flames threatened to destroy the palace and that he was in danger of falling alive into the hands of his enemies, he strangled Mustapha, threw his head to the besiegers, and then killed himself.

**BAIRAM,** bī-räm' *or* bī'räm. See BEIRAM.

**BAIRD,** ABSALOM (1824–1905). An American

soldier. He was born at Washington, Pa., graduated at West Point in 1849, served in 1850–51 as second lieutenant of artillery in the Seminole War, was assistant professor of mathematics at the Military Academy in 1853–59, and from 1859 to 1861 was on garrison and frontier duty. During the Civil War he served in the Peninsular campaign, in Tennessee, and in the Atlanta campaign, and in 1865 was brevetted major-general U.S.A. In 1866–68 he was inspector-general of the Department of the Lakes; in 1868–70 of the Department of Dakota; in 1870–72 of the Division of the South; and in 1872–81 and in 1885, of the Division of the Missouri. From 1885 until he was retired in 1888, he was staff inspector-general, with the rank of brigadier-general.

**BAIRD,** CHARLES WASHINGTON (1828–87). A Presbyterian scholar. He was born at Princeton, N. J., a son of Robert; graduated at the University of the City of New York (now New York University) in 1848 and at Union Theological Seminary in 1852; American chaplain in Rome, 1852–54; pastor of a Reformed Dutch church in Brooklyn, 1859–61; after that time pastor of the Presbyterian Church at Rye, N. Y. He is the author of *Eutaxia, or the Presbyterian Liturgics* (New York, 1855); *A Book of Public Prayer* (1857); *A History of Rye* (New York, 1871); *Bedford Church* (1882); and especially *A History of the Huguenot Emigration to America* (2 vols., New York, 1885). Unhappily he did not live to carry out his plans for this extensive and valuable work.

**BAIRD,** SIR DAVID (1757–1829). A British general. He was born, Dec. 6, 1757, at Newbyth, Scotland, and was left fatherless at an early age. His mother procured his entry to the army in 1772, as ensign in the Second Foot, and he joined his regiment at Gibraltar in 1773; in 1778 he received his lieutenancy and in the same year, on account of his distinguished bearing and great height, was appointed by Lord Macleod, a family friend, to be captain of the Seventy-third Grenadier Regiment, afterward famous as the Seventy-first Highland Light Infantry. He served in British India, 1780–89. In September, 1780, at Perambucum, heroically fighting against overwhelming odds, he was severely wounded, taken prisoner, and held captive by Hyder Ali. Released in March, 1784, he became, in 1787, major in his regiment and in 1789 returned to England. In 1790 he purchased the lieutenant-colonelcy of his regiment, but, owing to the delay of his agent in this transaction, on two subsequent occasions lost the succession as commander-in-chief of the army. In 1791 he returned to India and, after some minor service, in 1799 led the storming party at Seringapatam, having obtained that perilous honor at his own urgent request, Colonel Wellesley (afterward Duke of Wellington) commanding the reserve. His merit was acknowledged by the home government. In the following year he was appointed to the command of an expedition against Batavia, which was, however, afterward sent to Egypt, where he assisted in the final expulsion of the French. On his return to India he found that the star of Wellesley was in the ascendant; and Baird, who had already complained of the preference given to that officer and who was, besides, of opinion that his own merits were constantly overlooked, applied for leave of absence and sailed for Europe in 1803. He was received at court with great distinction, knighted in June, 1804, and made a K.C.B. in the following August. In 1805 he commanded an expedition against the Dutch Settlements at the Cape of Good Hope, which was successful; in 1807 he commanded a division at the siege of Copenhagen; and in 1808 was sent to Spain with an army of 10,000 men to assist Sir John Moore. He distinguished himself in the battle of Corunna, Jan. 16, 1809, when his left arm was shattered by grapeshot and had to be amputated. Moore was killed in the action, and Sir David succeeded to the chief command, and had the honor of communicating the intelligence of the victory to government. On this occasion he received, for the fourth time in his life, the thanks of Parliament and was created a baronet. He retired from active service in 1810 and was made commander of the forces in Ireland in 1820. He died Aug. 18, 1829. Consult Hook, *Life of General Sir David Baird* (London, 1832), and Gore, *Character of Sir David Baird* (London, 1883).

**BAIRD,** GEORGE WASHINGTON (1843– ). A rear-admiral, retired, of the United States navy, born in Washington, D. C. Following a public school and academic education, he studied engineering, was appointed third assistant engineer in the United States navy in 1862, and saw service during the Civil War. Promoted through successive grades up to 1905, he was then retired with the rank of rear-admiral. He became president of the Board of Education of Washington and was made a member of many engineering societies.

**BAIRD,** HENRY CAREY (1825– ). An American publisher and writer, born at Bridesburg, Pa. From 1845 to 1849 he was a member of the publishing house of Carey & Baird, of Philadelphia, and in the latter year reorganized the firm as Henry Carey Baird & Co. In politics he was first a Whig and then a Republican. In 1875 he became a leader of the Greenback party, which nominated him for State treasurer of Pennsylvania and for mayor of Philadelphia. The former nomination he declined. He supported the free-silver cause and the protective system. His publications include pamphlets and contributions to works of reference and to periodicals on banking, money, and other economic subjects.

**BAIRD,** HENRY MARTYN (1832–1906). An American historian and educator. He was born in Philadelphia, graduated at New York University in 1850 and at Princeton Theological Seminary in 1856; traveled in Greece and Italy, and from 1855 to 1859 was tutor at Princeton. From 1859 until the year of his death he was professor of the Greek language and literature in New York University. He became widely known for his researches in the history of the Huguenots. Among his works are: *History of the Rise of the Huguenots in France* (1879, 1907); *The Huguenots and Henry of Navarre* (1886); *The Huguenots and the Revocation of the Edict of Nantes* (1895). These three works comprise, in six volumes, a succinct history of French Protestantism from 1512 to 1802, which has been admired by American and continental scholars. In 1906 he became a pensioner under the Carnegie fund.

**BAIRD,** ROBERT (1798–1863). An American clergyman and author. He was born in Fayette Co., Pa., graduated at Jefferson College in 1818 and at Princeton Theological Seminary in 1822. He passed several years in Europe, where he

labored especially for temperance and the revival and consolidation of evangelical Protestantism. He was agent and secretary of the American and Foreign Christian Union. His works include: *A History of Temperance Societies in the United States* (1836); *A View of Religion in America* (1842); *Protestantism in Italy* (1845); *History of the Albigenses, Waldenses, and Vaudois*. Consult a *Life* by Henry M. Baird.

**BAIRD,** SPENCER FULLERTON (1823–87). An American naturalist. He was born at Reading, Pa., Feb. 3, 1823, of English and German parentage, and died at Woods Hole, Mass., Aug. 19, 1887. He graduated from Dickinson College, Carlisle, Pa., in 1840, and in 1842 studied at the College of Physicians and Surgeons in New York City. During these earlier years he had formed valuable and influential acquaintanceships with Audubon and Agassiz and other leaders of American zoölogy, in much of whose work he was a collaborator. In 1845 he was elected professor of the natural sciences in Dickinson College, but continued his original work. He became assistant secretary of the Smithsonian Institution in 1850 and entered upon his life work. This was the period of an extensive exploration of the western half of the United States, and Baird had charge of the energetic efforts made under the direction of the Smithsonian Institution to carry on a scientific investigation coincident with the geographical exploration of that region and of the formulation and publication of the results in the reports of the Pacific Railway surveys and elsewhere. He also stimulated private research and the deposit of objects in the care of the Smithsonian, thus laying the foundation of the National Museum, which was organized (1857) and developed by him. Upon the death of Joseph Henry in 1878, he became secretary of the Smithsonian, and still further advanced its work and collections in the direction of zoölogy and American archæology. Meanwhile he had been urging the need of the investigation and conservation of the fishes and fisheries of the United States, and through his action Congress created in 1874 the Commission of Fish and Fisheries, appointing Professor Baird its first commissioner—an office which he retained until his death, and wherein he organized the entire science and practice of fish culture (q.v.) in the United States and made it a model that has been widely copied in other countries.

In the dual relation which he sustained to two great branches of public scientific work, increased by his constant editing and writing for the press, Baird exerted an influence more extensive and stimulative than was exercised by any other man of his time. He trained a large number of men who have reached great usefulness and fame in various departments of scientific and economic natural history and is affectionately remembered by a great circle of students for his helpful kindness and encouragement. A complete bibliography of the titles of his works and papers to 1882 was compiled by G. Brown Goode and published as *Bulletin No. 20 of the United States National Museum* (Washington, 1883). It contains 1063 titles, to which the product of five more years is to be added. He edited the Smithsonian Reports from 1878 and several Reports of the United States Commission of Fish and Fisheries, to which he also contributed many special papers. Among the more important of his publications are: *Catalogue of North American Reptiles* (1853); *Birds of America* (with Cassin, 1860); *Mammals of North America* (1859); *History of American Birds* (with Brewer and Ridgway, 1874–84).

**BAIREUTH,** bī'roit. See BAYREUTH.

**BAISCH,** bīsh, HERMANN (1846–94). A German landscape painter and etcher. He was born at Dresden. He studied at the Stuttgart Academy, and in 1868 went to Paris, where he was much influenced by the works of Dupré and Rousseau. In 1869 he became a pupil of Lier at Munich, and soon became known for his landscapes, which are distinguished by careful observation and subtlety of atmospheric effects. He ranked as one of the first "plein air" painters of Germany. He received numerous medals, was honorary member of the principal German academies, and exercised a wide influence as professor of landscape painting (after 1881) in the Academy of Karlsruhe. His most prominent works include: "Mill by Moonlight" (1878, Stuttgart Gallery); "Dutch Canal Landscape" (1882, Dresden Gallery); "At the Watering-Trough" (Hanover Museum); and "Ebb-Tide near Dordrecht" (1884, Berlin National Gallery). He is also known as an illustrator, chiefly of the poems and proverbs of his brother, Otto Baisch.

**BAIT,** bīt. See BEIT.

**BAITER,** bī'tĕr, JOHANN GEORG (1801–77). A Swiss classical scholar born at Zürich. He studied at Munich, Göttingen, and Königsberg, was for some time professor in the University of Zürich, and in 1837–39, 1843–45, and 1849–65 was rector of the Zürich Gymnasium. With Orelli and Winckelmann, he prepared a collective edition of the works of Plato (1839–42); with Sauppe, one of the speeches of Lycurgus (1834), and *Oratores Attici* (1838–50); and he contributed the *Annales* (1858) to the second edition of Orelli's recension of Tacitus. He also published an edition of the *Fabellæ Iambicæ* of Babrius, then recently discovered (with Orelli, 1845). In conjunction with Orelli, and afterward with Halm, he bought out the second edition of Orelli's great edition of Cicero, and, with Kayser, edited the philosophical writings of Cicero for the Tauchnitz edition of the complete works of that author (1860–69). He owes his fame chiefly to his skill in textual criticism.

**BAIT FISHING.** The second great subdivision of angling, which is again divisible into fresh-water fishing and salt-water fishing. For fresh-water bait fishing a shorter and stiffer rod is required than is used for angling with a fly for the same fish. The bait generally is sunk by attaching a split shot, or other lead sinker, about a foot above the hook, and in still water sometimes a cork or quill float is attached to the line at a point which will allow it to float upon the surface of the water when the bait is at the desired depth. The bait varies almost as much as does the fly in casting; for trout those commonly employed are worms, grasshoppers, and minnows; for bass, minnows, the helgramite or dobson, crawfish, small frogs, grasshoppers, and crickets. For sea fishing of the ordinary nature, where the fish are not expected to weigh more than two pounds, a stout rod 8 or 10 feet long, with 100 yards of No. 12 Cuttyhunk and a strong single gut-leader 3 feet long, a small float and 2-0 hooks, with shrimp or shedder crab bait, will be found effective. From the

2-pound blue fish up to the giant tarpon, which is occasionally yet caught by "still-fishing," bait fishing passes through a wide variety.

Bait casting is a variety of bait fishing in which the sinker and float are discarded: as in angling for black bass the rod should be from 6 to 8 feet long, weigh not more than 8 ounces, and have a first-class quadruple multiplying reel holding from 80 to 100 yards of line attached. The minnow is hooked and reeled up to within a foot or two of the tip of the rod. With the thumb pressing firmly on the spool of the reel, to prevent the back lashing of the line the rod is swung at arm's length to the rear below the waist line and pointing downward, and then brought forward with a steady sweep until it points in the desired direction, when the pressure on the reel should be released sufficiently to permit the line to pay out. For an overhead cast the rod is swung back directly over the shoulder and then quickly forward, the line being released, when the rod is about perpendicular. When the line is running out, the reel should be held with the side plates parallel to the water and with the handle uppermost. Reeling in should begin instantly the bait strikes the water. See ANGLING; FLY CASTING; TROLLING.

**BAJA**, bŏ'yŏ. A market town of Hungary, in the country of Bács-Bodrog, near the Danube, about 90 miles south of Budapest (Map: Hungary, F 3). It has manufactures of alcohol and shoes and carries on a large trade in grain, fruit, wine, and hogs. It is the chief river port of the grain-producing district known as the Bácska. Pop., 1890, 19,500; 1900, 20,361.

**BAJADA DEL PARANÁ**, bà-hä'dà děl pà'rà-nä'. See PARANÁ.

**BAJAN.** See BEJAN.

**BAJAZET**, bä'zhà-zā'. One of Racine's tragedies, having for its hero Bajazet, brother of Amurath I, Sultan of the Turks, 1359–89. The plot hinges on the hero's choice between the throne and his mistress. The play was performed at Paris, on Jan. 4, 1672. The character also occurs, with a change of episode, in Marlowe's *Tamburlaine* (1587), and in Rowe's *Tamerlane*, a tragedy performed in 1702.

**BAJAZET I**, bä'yẹ-zēd', or **BAYAZID I**, bä'yà-zēd' (1347–1403). Sultan of the Turks from 1389 to 1402. He succeeded his father, Amurath I, who was killed on the battlefield of Kosovo. Immediately on ascending the throne he inaugurated his rule by strangling his younger brother, Yakub, lest he should dispute the succession. He overran Bulgaria and a part of Servia, Macedonia, and Thessaly and subdued most of the states of Asia Minor. He received the name of Yilderim, "Thunderbolt," either because of these victories or because of his murder of his brother. At Nicopolis he gained a decisive victory over the Allied Hungarians, Poles, and French on Sept. 28, 1396. The greater part of the French, through whose impetuosity the battle was lost, were taken prisoners and slain. In 1402 Bajazet led his army against Timur (q.v.), who had invaded Asia Minor, and was completely defeated by the Mongol ruler near Angora. Bajazet himself fell into the hands of the conqueror, who treated him with great generosity. The story that he was carried about imprisoned in a cage is without any historical foundation. Bajazet died in 1403 in the camp of Tamerlane. He was succeeded in the government by his sons, Solyman I, Musa, and Mohammed I, the last of whom became sole ruler in 1413. The reign of Bajazet was a period of great corruption, in which the people generally imitated the actions of the Sultan and his chief ministers. Consult Gibbon, *Decline and Fall of the Roman Empire*, vol. vii (London, 1900), and Lane-Poole, *Turkey* (New York, 1889).

**BAJAZET**, or **BAYEZID II** (1447–1513). Sultan of the Ottoman Empire from 1481 to 1512. He was the son of the Sultan Mohammed II, the conqueror of Constantinople. He engaged in continual wars with Poland, Venice, Egypt, and Persia, and strengthened the Ottoman power in Europe, though not without meeting frequent checks and reverses. His later years were disturbed by disputes among his sons about the succession to the throne. He died near Adrianople in 1513, shortly after abdicating in favor of his son Selim. He was a patron of learning, a lover of luxury and splendor, and built several magnificent mosques in Adrianople and Constantinople. See OTTOMAN EMPIRE.

**BAJAZET, MOSQUE OF.** One of the many beautiful mosques erected by Bajazet II (q.v.). It was built in 1505, at Constantinople, and still stands. Its court is surrounded by marble arcades, the capitals of which are of jasper, and contains an octagonal fountain in the centre. Four Persian doorways lead into the richly carved and decorated interior.

**BAJOCCO**, bà-yŏk'kō, or BAIOCCO, pl. BAJOCCHI (from *baio*, brown; so called from its brown-bay color). A copper coin in the Papal States equivalent to nearly a half-penny. It was 1-100 of the scudo, which was equal to $1.00. In the island of Sicily the Neapolitan *grano*, the 1-100 part of the ducato (= $.83) was also called a bajocco.

**BAJ'REE.** See GUINEA CORN.

**BAJURA**, bà-jōō'rà. The name of the banner of Mohammed.

**BA'JUS**, or **BAIUS**, MICHAEL—properly, DE BAY (1513–89). One of the most distinguished theologians of the Roman Catholic church in the sixteenth century. He was born in 1513 at Melin, Hainaut. He studied at Louvain and became doctor and professor of theology there in 1550. He was present at the Council of Trent in 1563 and also in 1564. He was the founder of the system of theology based directly on the Bible and the writings of the Fathers and setting aside the scholastic method. He assumed to base his theory on the writings of St. Augustine, whose doctrine of grace and free-will he sought to interpret into the entire inability of the human will to do good and into the absence of merit in all good works. His position was vigorously assailed by the Jesuits as unorthodox. The assertions that the human will, so long as it is left to its own freedom, can do nothing but sin, and that even the mother of our Lord was not free from original and actual sin, together with other such doctrines, drew on him the accusation of heresy. Seventy-nine of his propositions were condemned by Pope Pius V, in 1567, in the bull *Ex Omnibus Afflictionibus*, but he was not named as the author of them. Bajus submitted in 1569, but nevertheless did not give up his doctrines. He retained his position and was made chancellor of his university in 1575, but this did not shield him from the criticisms of his theological opponents. Gregory XIII confirmed the condemnation in the bull *Provisionis Nostræ*, Jan. 28, 1579, and Bajus was obliged

a second time to make explanation. He died at Louvain, Sept. 15, 1589, having earned the reputation of great learning, pure manners, and singular modesty. He may be regarded as the predecessor of the Jansenists, who inherited his Augustinian view, which was at that time termed Bajanism. His writings, mostly of a polemical nature, were published by Gerberon (2 vols., Cologne, 1696). Consult F. X. Linsenmann, *Michael Bajus und die Grundlegung des Jansenismus* (Tübingen, 1867).

**BAJZA,** boi'zŏ, JÓZSEF (1804–58). A Hungarian poet and critic, born at Szücsi, county of Heves, Jan. 31, 1804. When barely 20, he began contributing to Kisfaludy's *Aurora*, which has been called the cradle of modern Hungarian poetry and which Bajza afterward edited from 1830 to 1837. He was also editor of *Kritikai Lapok* ('Critical Leaves'), during 1830–36, and of the *Athenæum*, 1837–43; and these, together with Toldy's *Figyelmezö* ('Observer'), were the principal vehicles of his thoughtful essays and unsparing criticism, which exerted a strong and beneficent influence upon the rising Hungarian literature. His poems (Pesth, 1835) earned him a place among the best of his country's lyric poets. Through the publication of a series of foreign plays, and as director of the National Theatre at Pesth, he also gave valuable aid to the cultivation of a national drama. Later, his interests turned largely to history and bore fruit in 'Historical Library' (*Történeti Könyvtár*, 6 vols., Pesth, 1843–45), containing translations from many excellent foreign works; and a compilation from the German, 'The New Plutarch' (*Uj Plutarch*, Pesth, 1845–47). After March, 1848, Kossuth appointed him editor of his semi-official organ, the *Kossuth Hirlapja* (May to December). He died March 3, 1858, from a brain disease, which had been slowly developing for eight years. Bajza stands unsurpassed in the Hungarian literature for his perfection of poetic form. Because of his cold classicism Bajza did not attain the popularity of his fiery and patriotic contemporary Vörösmarty. His *Collected Works* have been edited by Toldy (6 vols., Pesth, 1861).

**BAKACS,** bō'köch, TAMÁS (?–1521). A Hungarian statesman and prelate, who was born about the middle of the fifteenth century. Though by birth a peasant, he became secretary to King Matthias Corvinus. He held various bishoprics, became Archbishop of Gran, and on the accession of Ladislaus II was made chancellor of the kingdom, and later Cardinal-Primate of Hungary and papal legate. He afterward preached a crusade against the Turks; but his army of peasants and vagabonds turned their arms against the nobility and clergy and a civil war ensued, accompanied by great cruelty on both sides, till it was ended by the rout of the insurgents by John Zápolya. Bakacs died in 1521, leaving an immense fortune.

**BAKAIRI,** bä-kä-ĭ-rē'. A detached Cariban tribe of primitive type, living about the headwaters of the Xingú River, central Brazil. They were visited in 1884 by Von den Steinen, who made the first scientific study of them and their language, which he regarded as the oldest representative of the Cariban linguistic stock, and thus of some ethnological importance. Consult Von den Steinen, *Durch Central-Brasilien* (Leipzig, 1888), and *Die Bakairi-Sprache* (Leipzig, 1893).

**BAKALAI,** bä-kä'lī. A Bantu tribe on the Ogowe, French Equatorial Africa. They have been pushed to the west by the warlike Fans, losing their former skill as workers in iron and copper and becoming traders. They number more than 100,000. Their religion is Mohammedan; learning is at a standstill. Consult Keane, *Ethnology* (Cambridge, 1896), and Deniker, *Races of Man* (London, 1900).

**BAKAR.** See BUCCARI.

**BAKAU,** bä-kou'. The capital of a district of the same name in Moldavia, Rumania, on the Bistritz, 188 miles north of Bucharest, by rail (Map: Balkan Peninsula, F 1). It has a gymnasium and some trade in agricultural products. Pop., 1899, 16,187; 1913 (provisional census), 18,985.

**BAKE,** bä'ke, JAN (1787–1864). A distinguished Dutch philologist, born at Leyden, Sept. 1, 1787. He held the professorship of Greek and Roman literature in the University of Leyden for the long period of 42 years (1815–57). His first important publication was a valuable contribution to the literature on Posidonius (1810), and this was followed by a learned edition of Cleomedes (1820). In collaboration with Geel, Hamaker, and Peerlkamp he published the *Bibliotheca Critica Nova* (1825–31) and independently contributed various classical articles to the *Scholica Hypomnemata* (1837–62). He brought out critical editions of Cicero's *De Legibus* (1842), the rhetorical work of Apsines and of Longinus (1849), and Cicero's *De Oratore* (1863). He died March 26, 1864. He was the brother of the philologist and jurisconsult ALEXANDER BAKE (1791–1844).

**BAKEL,** bä'kĕl'. A strongly fortified town, capital of the arrondissement of the same name, in the French colony of Senegal, northwest Africa, on the left bank of the Senegal River, northwest of Kayes (Map: Africa, C 3). Bakel has belonged to France since 1820 and was of great strategic importance in the wars with the natives. It is an important trade centre and the meeting place of caravans from the upper Senegal basin and the Niger. The trade is chiefly in dates, rice, beeves, ivory, and gold dust. During the rainy season it has direct navigation with St. Louis on the coast. Pop., 1900, 1760.

**BA'KELITE.** An artificial coal-tar product, used as a substitute for hard rubber, celluloid, or amber, and valuable for its properties of electrical insulation and resistance to heat. This substance was invented by the chemist, Dr. Leo Baekeland, from whom it derives its name. For its invention Dr. Baekeland received the Nichols medal of the American Chemical Society in 1909. Chemically bakelite is oxybenzylmethylenglycol anhydride. It is produced by warming together equal weights of phenol and formaldehyde and a small amount of an alkaline agent. The mixture separates into two layers, the upper of which is an aqueous solution, while to the lower, an intermediate condensing product, is given the name of "A." If the latter is heated above 100° C., a final condensing product called "C" is obtained, which may be avoided by working under a pressure of 50 to 100 pounds per square inch. The product so resulting is a hard solid mass, which is known as bakelite. It has a specific gravity of 1.25, is very hard and inelastic, and is an excellent insulator for both heat and electricity. As it is cheaper than hard rubber, it has found extensive application in electrical apparatus,

and for the same reason it is supplanting casein and celluloid in other fields. Wood soaked in the "A" product, and then heated under pressure, becomes coated with it so that it will appear as with a firm and waxy varnish. Cardboard, also, can be made into hard-polished sheets, and metal surfaces can be given a like coating. It also serves as a powerful cement, as, for example, in forming grindstones and like purposes.

**BAKER.** A city, and the county-seat of Baker Co., Ore., 357 miles east by south of Portland, on the Powder River, and on the line of the Oregon Railroad and Navigation Company (Map: Oregon, H 3). It is in the centre of the eastern Oregon mining region and has a considerable trade as a distributing point for this district as well as an export trade in lumber, wool, live stock, and products of the mines. Gold mining, lumbering, stock raising, flour milling, clay and stone quarrying, and agriculture are the leading industries, and manufacturing interests are represented by saw and planing mills, iron works, brewery, brickyards, etc. Among points of interest in or near the city are the opera house, hospital, Masonic temple, natatorium, and several mines. Settled in 1860, as Baker City it was incorporated in 1872 and has since adopted the commission form of government. There are municipal water works, and electric light plant. Pop., 1900, 6663; 1910, 6742.

**BAKER,** Sir Benjamin (1840–1907). An eminent British civil engineer, born in England. He designed the cylindrical ship that transported one Cleopatra's Needle to America and the other to England, planned with Sir John Fowler the great Forth Bridge, and assisted in the construction of the great Assouan dam in Egypt. He also had an important part in designing the Blackwall tunnel, the great Tower Bridge in London, and the Metropolitan Railway system in that city. He published *Long Span Railroad Bridges* (1870).

**BAKER,** Charles Fuller (1872–1927). An American zoölogist, born in Lansing, Mich. He graduated in 1892 from the Michigan Agricultural College, where during his course he acted as assistant in zoölogy. After filling several positions in secondary schools and colleges as a teacher of biological subjects, he became an assistant professor at Pomona College, Cal., in 1903. Subsequently he was for several years chief of the department of botany at the Cuban agronomical station, then curator of the botanical garden and herbarium at the Museu Goeldi in Pará, Brazil. After serving in other similar positions in South America, he returned in 1908 to the United States and to Pomona College as professor of biology. He was in charge of the Colorado zoölogical and forestry exhibit at the Chicago World's Fair in 1893, and four years later became zoölogist and associate botanist to the Alabama botanical survey. Besides serving as botanist to the H. H. Smith exploring expedition in the Santa Marta Mountains in Colombia (1898–99), he himself conducted field explorations in several Western States and in Nicaragua, Cuba, and Brazil. He became editor of the *Pomona Journal of Entomology* and published *Invertebrata Pacifica* and (coöperatively) *Economic Plants of the World.*

**BAKER,** Edward Dickinson (1811–61). An American soldier and lawyer. He was born in England, but came to this country in 1816. He practiced law at Springfield, Ill., became prominent in politics, and was a member of the Illinois Legislature from 1837 to 1844, when he was elected to Congress. He resigned in 1846 to serve in the Mexican War and commanded a brigade at the battle of Cerro Gordo. After the war he was again elected to Congress. He declined a renomination in 1850, and in 1851 settled in San Francisco, where he soon became the leader of the California bar. Thence he went to Oregon and was United States Senator from that State. When the Civil War began, he raised a regiment in New York and Philadelphia. He declined a commission as brigadier-general and was killed at Ball's Bluff while leading a desperate charge. Consult J. D. Baltz, *Lancaster, Pa.* (1888), and Willard Glazier in *Heroes of Three Wars* (1880).

**BAKER,** Frank (1841– ). An American zoölogist and anthropologist, born at Pulaski, N. Y. He graduated at the Columbian (now George Washington) University in 1880 (M.D.), took his master's degree at Georgetown University in 1883, and Ph.D. at the same institution in 1890. He became assistant superintendent of the Life-saving Service in 1889 and superintendent of the National Zoölogical Park at Washington in 1890. In 1883 he was appointed professor of anatomy in the Medical School of Georgetown University and was elected vice president of the American Association for the Advancement of Science in 1890. For the seven years following 1890 he was editor of the *American Anthropologist* and in 1897 was made president of the Association of American Anatomists.

**BAKER,** Frank Collins (1867– ). An American zoölogist, born at Warren, R. I. He studied at Brown University and at the Philadelphia Academy of Natural Sciences. The latter institution sent him on a Mexican exploring expedition in 1890. After serving as zoölogist of invertebrates at Ward's Natural Science Establishment, Rochester, N. Y., he became curator of zoölogy of the Field Columbian Museum of Chicago in 1894, and curator of the Chicago Academy of Sciences in the same year. His publications include: *A Naturalist in Mexico* (1895); *Mollusca of the Chicago Area* (1898–1902); *Shells of Land and Water* (1903); *The Lymnæidæ of North and Middle America* (1911).

**BAKER,** George Pierce (1866– ). An American scholar, writer, and educator, born in Providence, R. I. Graduating from Harvard in 1887, he became in the year following instructor in English at that university and thereafter successively instructor in forensics (1889), assistant professor of English (1895), and professor of English (1905). He established and carried on a department of dramatic writing and criticism at Harvard. His writings include: *The Principles of Argumentation* (with H. B. Huntington, 1895, 1905) and *The Development of Shakespeare as a Dramatist* (1907). Also he edited *The Forms of Public Address* (1904), *Some Unpublished Correspondence of David Garrick* (1907), *The Correspondence of Charles Dickens and Maria Beadnell, Hamlet* (1913), and various Elizabethan plays.

**BAKER,** Henry (1698–1774). An English naturalist. He was brought up to the bookselling business, but afterward devoted himself to scientific studies, especially to botany and microscopy. In 1744 he received the Copley medal from the Royal Society for his microscopic study of saline particles. Among his

works may be mentioned *The Microscope Made Easy* (1743), *Employment for the Microscope* (1753), and some poetical works.

**BAKER,** H. Brereton. An English chemist, born at Blackburn, Lancashire. He was educated at Balliol College, Oxford, where he was a scholar in natural science in 1879 and a demonstrator in chemistry in 1883–85. From 1885 to 1902 he was head of the science department in Dulwich College and in the following year served as head master of Alleyn's School, Dulwich. He became professor of chemistry in the Imperial College of Science and Technology, London, in 1912. His publications include "Combustion in Dried Gases" in the *Philosophy Transactions* (1888), and in the *Journal of the Chemical Society* the following: "Action of Light on Silver Chloride" (1892); "Drying of Ammonia and Hydrogen Chloride" (1898); "Union of Hydrogen and Oxygen" (1902); "Gaseous Nitrogen Trioxide" (with Mrs. Baker, 1907).

**BAKER,** Ira Osborn (1853–1925). An American civil engineer, born at Linton, Ind. He graduated from the University of Illinois in 1874 and in the same year became assistant in civil engineering and physics at that institution. He was appointed instructor in civil engineering in 1878, assistant professor in 1880, and professor in 1882. Besides contributions to technology journals, his writings on engineering subjects include *Leveling* (1886), *Treatise on Masonry Construction* (1889, 1909), *Engineers' Surveying Instruments* (1882, 1909), and *Treatise on Roads and Pavements* (1903).

**BAKER,** James Heaton (1829–1913). An American soldier and politician, born at Monroe, Ohio. He was educated at Ohio Wesleyan University. After having served as Secretary of State of Ohio (1854–56) and of Minnesota (1857–61) he entered the army as colonel of the Tenth Minnesota Volunteer Infantry and was brevetted brigadier-general and was mustered out of service in 1865. Subsequently he served as United States commissioner of pensions under President Grant, as surveyor-general of Minnesota (1875–79), and as state railroad commissioner (1881–86). In 1879 he purchased two Republican newspapers which he combined under the name of the *Mankato Free Press*. He published "Lake Superior" in *Minnesota Historical Society Collections* (1879); "The Sources of the Mississippi," *do.* (1887); *The Lives of the Governors of Minnesota* (1908).

**BAKER,** John Gilbert (1834–1920). An English botanist. Born at Guisborough, England, he was educated at the schools of the Society of Friends at Ackworth and York. Later he became lecturer on botany at the London Hospital and in 1866 was appointed assistant curator at the Kew Herbarium. From 1890 to 1899 he was keeper of Kew Gardens. Baker was associate editor of the *Journal of Botany* and published several works of importance on systematic botany, among the more important of which are the following: *Synopsis Filicum* (London, 1883), which is a later edition of the work begun by J. D. Hooker under the same title in 1868 and which is a descriptive catalogue of all species of ferns known at that time; *Monograph of the British Roses* (1869); *Monograph of the Ferns of Brazil* (1870); *Flora of Mauritius and the Seychelles* (1877); *Flora of the English Lake District* (1885); *Handbook of the Fern Allies* (1887); *Handbook of the Amaryllidaceæ* (1888); *Handbook of the Bromeliaceæ* (1889). A large number of shorter papers on botanical subjects have appeared in scientific journals. Baker was elected to the membership of the Royal and Linnæan societies and received honors from several scientific associations.

**BAKER,** Moses Nelson (1864– ). An American editor and writer, born at Enosburgh, Vt. He graduated from the University of Vermont (collegiate department) in 1886 and from the engineering school, with the degree of C.E., a year later. In 1887 he became associate editor, and in 1908 editor, of the *Engineering News*. Montclair, N. J., chose him as the president of its board of health in 1904. As the result of special study of matters connected with sewage disposal and with municipal government, he wrote: *Sewage Purification in America* (1893): *Sewage Disposal in the United States* (joint author, 1894); *Potable Water* (1899); *Municipal Engineering and Sanitation* (1901); *British Sewage Works* (1904). He was editor of the *Manual of American Water Works* (1888–91, 1897) and of the *Municipal Year Book* (1902). He also edited the departments of municipal engineering and municipal government in The New International Year Book and revised articles in these departments for The New International Encyclopædia.

**BAKER,** Ray Stannard (1870– ). An American journalist and author. He was born in Lansing, Mich., and graduated from the Michigan Agricultural College in 1889. A partial law course, and studies in literature, he took at the University of Michigan. He was reporter and sub-editor on the Chicago *Record* (1892–97), managing editor of McClure's Syndicate (1897–98), and associate editor of *McClure's Magazine* (1899–1905). In 1906 he became one of the owners and editors of *The American Magazine*. One of the most widely read journalists of his day, he contributed to *McClure's* and other magazines several notable series of articles on social and economic conditions in the United States. Among his writings are: *Boys' Book of Inventions* (1899); *Our New Prosperity* (1900); *Seen in Germany* (1901); *Boys' Second Book of Inventions* (1903); *Following the Color Line* (1908); *New Ideals in Healing* (1909); *The Spiritual Unrest* (1910).

**BAKER,** Sir Richard (1586–1645). The author of the *Chronicle of the Kings of England from the Time of the Romans' Government unto the Death of King James*, a book long esteemed and quoted on all matters of English history by the country gentry. Addison makes his model squire, Sir Roger de Coverley, refer to it frequently. Baker was born in Kent, was educated at Oxford, and in 1603 was made a knight. About 1620 he married and settled in Oxfordshire, of which county he was made high sheriff; but he was soon after thrown into the Fleet Prison for the debts of his wife's family which he had assumed, and here he wrote his *Chronicle*, first published in 1641, besides several pious works of less note. He died in prison in great poverty.

**BAKER,** Sir Samuel White (1821–93). An English traveler, explorer, and sportsman, born in London. He studied in England and Germany and in 1848 established an agricultural colony at Newara Eliya, Ceylon, where he remained until 1855 and achieved much reputation as a hunter of big game. In 1859–60 he superintended the construction of a railway connecting the Danube with the Black Sea. In

1861 he set out from Cairo for the discovery of the source of the Nile. He first explored the Atbara, Setit, and other Nile tributaries of northern Abyssinia, added somewhat to geographical knowledge of the region, and demonstrated that to these tributaries the Nile sediment is due. Thence he (in 1862) proceeded up the Nile to Gondokoro, where he awaited the arrival of Speke and Grant, who had left Bagowayo in 1860, and the former of whom had discovered the Victoria Nyanza to be the true Nile source. Informed by Speke of another lake, said to be crossed by the Nile on the river's course to Gondokoro, he continued his journey amid the defiance of the slave traders and the mutiny of his troops, and on March 14, 1864, discovered the Albert Nyanza. Thus, notwithstanding the inaccuracy of some of his observations, subsequently rectified by Stanley, he had finally cleared away the mystery from the Nile problem which, since Herodotus, had perplexed the world. In 1869–73, with the rank of pasha and major-general, he commanded an expedition sent out by the Khedive of Egypt for the suppression of the slave traffic, the establishment of regular trade, and the opening to commerce of the great equatorial lakes. Subsequently he explored and hunted in Cyprus, Syria, India, Japan, and the United States. He wrote: *The Rifle and the Hound in Ceylon* (1853); *Eight Years' Wanderings in Ceylon* (1855); *The Albert Nyanza* (1866); *The Nile Tributaries of Abyssinia* (1867); *Cast up by the Sea* (1868); *Ismailia* (2 vols., 1874); *True Tales for my Grandsons* (1883); *Wild Beasts and their Ways* (1890). Consult the T. D. Murray and A. S. White *Memoir* (London, 1895).

**BAKER,** THOMAS (1656–1740). An English antiquary and author. He was born at Lanchester, Durham, and was educated at St. John's College, Cambridge, where he soon became a fellow. As a non-juror he lost in 1690 the rectory of Long Newton, and in 1717 his fellowship, but spent the last 50 years of his life at Cambridge. He is known chiefly from his valuable manuscript collections, comprising 42 folio volumes, on the history and antiquities of the University of Cambridge. His history of St. John's College was edited by Professor Mayor in 1867.

**BAKER,** VALENTINE (1827–87). An English soldier, known as Baker Pasha, brother of Sir Samuel White Baker. He served in the Kaffir War (1852–53), received two medals for bravery in the Crimean War, and was promoted to colonel of the Tenth Hussars in 1860. He left England in 1873 to explore the northeastern frontier of Persia and described his journey in *Clouds in the East* (1876). In 1875 he was imprisoned and cashiered for insulting a young woman in a railway carriage. He entered the service of the Sultan in 1877, took part in the Turko-Russian War as major-general unattached in Mehemet Ali's army, and wrote a history of that campaign, entitled *The War in Bulgaria* (2 vols., 1879). He was summoned to Cairo by the Khedive in 1882 to be commander in chief of the Egyptian army, but on arriving there he was offered the command of the Egyptian police instead. Ordered to Suakim after the defeat of Hicks Pasha (November, 1883), he was defeated near Tokar by a body of Osman Digna's troops in 1884. He then returned to England and in 1885 was appointed to General Wolseley's staff; but Queen Victoria refused to ratify any appointment restoring him to the British army. In 1887 he went again to Egypt, and died at Tel-el-Kebir.

**BAKER,** WILLIAM MUMFORD (1825–83). An American author, born in Washington. He graduated at Princeton and was a Presbyterian pastor successively at Galveston and Austin, Tex., and at Newburyport and South Boston, Mass. Besides *Inside: A Chronicle of Secession* (1866), considered his most important work, he wrote a number of tales, including *The Virginians in Texas* (1878), *The New Timothy* (1870), *His Majesty, Myself* (1879), and *Blessed Saint Certainty* (1881).

**BAKER, AND THE BAKER'S WIFE,** THE. Popular names for Louis XVI and Marie Antoinette, because of their giving bread to the starving rioters who collected before the Palace of Versailles, Oct. 6, 1789.

**BA'KERIES,** MILITARY. See FIELD KITCHEN.

**BAKER'S AN'TELOPE.** A large antelope (*Hippotragus bakeri*) of the Sudan, with horns of a massive type. It is pale liver-red, with penciled ears and some black stripes on the shoulders. It was named after its discoverer, Sir Samuel Baker.

**BAKER'S DOZ'EN.** The number 13, instead of the usual 12. The custom of using 13 for a dozen is supposed to have originated when heavy fines were imposed for short weights, and the bakers in particular added an extra unit to guard against a possible short weight. The number 13 has also been called the Devil's Dozen, referring in that case to the number of witches supposed to assemble at each of their great festivals, and also to the superstition that 13 is an unlucky number. See WITCHCRAFT.

**BA'KERSFIELD.** A city and the county-seat of Kern Co., Cal., 168 miles northwest of Los Angeles, on the Southern Pacific and the Atchison, Topeka, and Santa Fe railroads, and on Kern River (Map: California, G 7). It has a public library and fine county buildings. The city controls important commercial interests as the centre of an oil, natural-gas, live-stock, and fruit-growing region, and contains foundries and machine shops, refineries, extensive gold mines, planing and flouring mills, packing houses, etc. There are also large deposits of fuller's earth, gypsum, borax, marble, salt, copper, tungsten, iron, and sulphur. A considerable water power is developed from the Kern River. Bakersfield was settled in 1872. Pop., 1890, 2626; 1900, 4836; 1910, 12,727; 1920, 18,638.

**BAKER UNIVERSITY.** A coëducational institution at Baldwin, Kan., founded in 1858 by the Kansas Conference of the Methodist Episcopal church. The departments include the College of Liberal Arts, academy, musical conservatory, public speaking, fine arts, household arts, preparatory professional courses, and summer school. In 1913 there were 32 instructors and 515 students. President, Wilbur N. Mason, D.D.

**BAKE'WELL** (anciently, *Badecan-willan*, protected wells, from AS. *þeccan*, Ger. *decken*, to cover = *wella, wylla*, spring, Eng. well). A small but ancient town in Derbyshire, England, on the Wye, 25 miles northwest of Derby (Map: England, E 3). It lies in the midst of beautiful scenery; in the vicinity are black-marble and limestone quarries and coal and zinc mines. Arkwright first established cotton mills here. The town has chalybeate springs and warm baths, a museum, and a spacious old Gothic church. In the seventeenth century the plague

ravaged and almost depopulated this town. Pop., 1901, 2850; 1911, 3078.

**BAKHMUT,** bäk-mōōt′. The chief town of the district of the same name, in the government of Ekaterinoslav, south Russia (Map: Russia, E 5). It lies in a hollow on the banks of the Bakhmut, a shallow affluent of the north Donetz River. In its immediate vicinity are deposits of salt of great purity and thickness of vein. A number of foreign companies exploit the mineral from which they also manufacture soda. The region, within a radius of 60 to 80 miles, abounds in coal, both of the cheaper and the anthracite varieties, and quicksilver is also mined. In the city salt is manufactured by the evaporating process from water drawn from wells. The product is accounted among the best in the world and is exported widely. Among the industrial establishments are glass, fireproof-brick, lime, and cement factories, iron and flour mills and breweries. The town was settled in the seventeenth century and was surrounded by a wooden wall in 1703; 80 years later it was promoted to the rank of chief town of the district. Pop., 1897, 19,400.

**BAKHTCHISARAI,** bäk′chê-sâ-rī′ (Pers. palace of gardens, from *bakhtcha,* garden, orchard + *sarāi,* palace, inn). The residence of the ancient princes or khans of the Crimea, situated in a narrow limestone valley about 20 miles from Simferopol, the capital of the government of Taurida, Russia (Map: Russia, D 6). It is a typical Tatar town and has 36 mosques, one Christian church, and two synagogues. In the centre of the city is the famous palace or Khansarai. Built in 1519 by the Khan Abdul-Sakhal-Gerai, the magnificent palace, after years of decay, was restored to its former grandeur in 1787 by orders of Prince Potemkin. Of the other noteworthy buildings, the mosque of the Khan is probably the most magnificent; it was erected in 1737 by the Khan Selamit-Gerai. In one of the old Jewish synagogues a parchment roll of the Bible—the most ancient, according to some Hebrew scholars—was discovered. It is now in the Imperial Library. The principal articles of manufacture are the well-known red and yellow morocco leather, fur coats, boots and shoes, and cutlery. The town is a mart for the products of the neighboring country, such as tobacco, flax, grain, and especially fruits. Its population, principally Mohammedans, numbered (1897) 13,000, including 3000 Christians, 1000 Jews (mainly Karaites), and some Greeks.

**BAKHTEGAN,** bäk′te-gän′ (Map: Persia, E 6). A salt lake in southwest Persia, to the east of Shiraz, 74 miles long, and from 4 to 13 miles broad. It is formed by the Kur River. Its altitude is 5100 feet above the sea. Large deposits of fine salt are gathered from its basin when the lake dries up in summer.

**BAKHUIZEN VAN DEN BRINK,** bäk′hoi-zen vän dän brĭnk, Reinier Cornelis (1810–65). A Dutch historian. He was born at Amsterdam, Feb. 28, 1810. Among his noteworthy achievements must be mentioned *Vondel met Roskam en Rommelpot* (new ed., 1891), *Variæ Lectiones ex Historiu Philosophiæ Antiquæ* (1842), *La retraite de Charles Quint* (1842), and *Het huwelijk van Prins Willem met Anna van Saksen* (1853). He was in 1854 made keeper of the state archives and published *Het Rijksarchief* (1857) and *Cartons voor de geschiedenis van den nederlandsche Vrijheidsoorlog* (1860–77). He died at The Hague, July 15, 1865. Not the least of his services to Holland was his connection with *Gids,* a monthly publication of very high aim.

**BAKHUYSEN,** bäk′hoi-zen, Ludolf (1631–1708). One of the foremost Dutch marine painters. He was born at Emden and began as a clerk and writing teacher in Amsterdam. His masters in painting were Aldert van Everdingen and Heinrich Dubbels, and he soon rose to the first rank in marine painting. The rival of Wilhelm van der Velde, who painted "The Calm," Bakhuysen depicted stormy seas and many times risked his life and those of seamen in the pursuit of studies for his pictures. His coloring does not compare favorably with that of his rival; nevertheless he portrays the spirit of the sea, particularly in its wild and boisterous aspects. He has left numerous examples of his work, and many of them are of considerable size. One, representing a coast scene of great beauty, dated 1675, is in the Amsterdam Museum. In the Louvre is his "Rough Sea at the Mouth of the Maas." Two of his pictures are in the Museum at The Hague. Many are in England, seven being in the National Gallery, London. Peter the Great was his pupil, and the painter made for the Czar numerous drawings for the construction of vessels. The King of Prussia and other European princes are said to have visited his studio. After he was 71 years old he began etching on copper. He also painted portraits of considerable ability. Consult Van der Willigen, *Les artistes de Haarlem.*

**BA′KING.** The mode of cooking food in a heated chamber or oven. The term is also applied in the manufacture of bricks, pottery, etc. The oven of a kitchen range is simply an iron chamber, with flues for conveying the heated gases of the fire round it and usually provision for ventilation. Ovens are now often heated by water or by steam and also by gas and electricity. The chemical as well as the mechanical effect of cooking upon food is explained in the article on Cookery. The chemistry of bread baking is discussed under Bread.

**BAKING POW′DER.** A chemically prepared material used as a substitute for yeast in making bread, biscuits, etc. Bicarbonate of soda, tartaric acid or bitartrate of potash, and acid calcium phosphate mixed with starch or flour are the materials from which the baking powders are very commonly made. When water is added to these substances in making bread, they combine and give off carbonic-acid gas or carbon dioxide, exactly as does yeast by fermenting, which causes the bread to rise. Sometimes in place of tartaric acid alum is substituted to cheapen the cost of production. The possible harmfulness of alum for the purpose is a disputed point. Bicarbonate of ammonia is sometimes used to leaven foods. A domestic method uses bicarbonate of soda and sour milk or cream of tartar (potassium bitartrate). See Bread.

**BAKONY WALD,** bŏ′kŏn-y′ vālt, or **BAKONY FOR′EST.** A chain of mountains in Hungary, extending northeastward from the neighborhood of Lake Balaton towards the bend of the Danube (Map: Hungary, F 3). It is about 60 miles long, over 20 miles in width, and densely covered with forests. Numerous herds of swine are reared within its limits. Its average height is not over 2000 feet: the highest peaks are found on the western side. The lower parts of the chain are under cultivation; a considerable export trade is carried on in the excellent

marble of several quarries, and there are numerous villages in the valleys. The railway line from Stuhlweissenburg to Komorn winds through the chain, reaching its highest point near Gombas (1220 feet).

**BAKSHEESH,** bāk'shēsh', or **BAKSHISH** (Pers. *bakhshīsh,* a present). In the East, in modern times, in special significance of gratuity (Ger. *Trinkgeld*), which, however, the Orientals do not quietly wait to receive, but loudly and even insolently demand. Every traveler, whether in Turkey or in Egypt, in Asia Minor or in Syria, if he receives the smallest service from any native, is immediately reminded, by the cry of "Baksheesh, Baksheesh," to pay for the courtesy by a monetary gift.

**BAKST,** bākst, LEON NIKOLAJEWITSCH (1886–1924). A Russian decorative designer. He was born in St. Petersburg, of Jewish parentage, and studied there in the Academy of Arts. Under the patronage of a Russian Grand Duchess, he continued his studies in Paris. Returning to Russia, he was active at Moscow, painting interesting genre scenes of Russian life and portraits in the conventional manner, several examples of which are in the Tretiakoff Gallery, Moscow. His reference to political conditions in his paintings displeased the Russian authorities, and he removed to Paris in 1906. He soon became known as a designer of stage settings and achieved universal recognition, when the Imperial Russian ballet visited the French capital in 1909, with the productions of *Cleopatra* and *Scheherazade.* These were followed by the remarkable designs for *Salome,* with Egyptian settings, *Narcissis, Daphnis and Chloe,* and *A Faun's Afternoon* in Greek settings, *The Blue God,* Anamese and Javanese, *Thamar,* Transcaucasian and Chinese. *The Butterflies,* and *The Carnival.* He also designed settings for Wolf-Ferrari's opera, *The Secret of Suzanne,* in rococo, Boris Godounow in Byzantine settings, and for D'Annunzio's *La Pisanelle* (Renaissance) and *Saint Sebastien* (mediæval). The ballet for his most recent production, *The Orientale,* was given in New York in 1914 with the celebrated Russian dancer Pavlowa in the leading rôle. His designs are characterized by extraordinary richness and brilliancy of color, caused by pure tones interplaying with remarkable chromatic effect. His drawing is conventionalized, but highly characteristic. His teeming imagination is only equaled by his remarkable fertility of invention. An interesting exhibition of his principal designs and drawings was held in New York and other American cities in the winter of 1913–14.

**BAKU,** bä-kōō' (a corruption of the Pers. *badkubu,* given to it on account of the destructive winds of that region). The seat of administration of the Russian government of Baku in the Caucasus; an important seaport and naval station on the west coast of the Caspian Sea, on the peninsula of Apsheron (Map: Russia, J 6). It is an important commercial and manufacturing centre, has several shipbuilding yards, and is known especially for the rich petroleum wells in its neighborhood. On the new quay, which is about a mile in length, along the shore south of the city, there are modern stores and bazaars, many fine buildings, and the ancient garden of the khans. The older town, laid out in terraces on the slope of a hill, has irregular, narrow streets and alleys lined with low, wooden, flat-roofed houses. Here are the ruins of the palace of the khans—once a magnificent edifice built in the Mussulman style of the fifteenth century, and the mosques of the shah, erected in 1078. North of the harbor, also on the shore, is the so-called "black town," whither the crude oil is conducted through pipe lines from the oil wells 8 or 9 miles north of the town, and where it is refined for the market.

The climate of Baku is mild, its harbor having frozen but once in 80 years; the mean temperature for the year is 58° F., for January 38°, and for July about 78°. The city owes its prosperity to the petroleum industry. In addition to oil refineries there are a number of mills, tobacco factories, shipbuilding yards, and chemical works. The advantageous position of Baku near the Persian frontier and at the eastern terminus of the Transcaucasian Railway has made it the *entrepôt* for the Russo-Persian trade. Cotton, rice, silk, wine, dried fruits, and walnut wood pass through Baku from Persia on their way to Russia and western Europe, in exchange for various goods of Russian manufacture. The growth of Baku's population has kept pace with that of its industry. In 1860 it numbered only 13,800; in 1897, 112,253; in 1904, 177,777; in 1910, 217,900. The predominating element is Tatar. This race constitutes the bulk of the laborers and small traders; Russians are next in number and fill the official positions as well as some of the commercial and financial posts; Armenians are numerous, and among them are the leading merchants. The petroleum industry is largely in the hands of foreign capitalists.

The date of the founding of Baku is not known; the town is mentioned by an Arab geographer of the tenth century. The easily igniting gases, arising from the soil saturated with petroleum, seem to have been known to the ancient Parsis, or fire worshipers, and attracted great numbers of pilgrims. Baku was in possession of the Persians from 1509 to 1723, when it was captured by the Russians; the latter restored it to the Persians in 1735, but in 1806 it passed finally to Russia. A vast conflagration took place in 1901. In September, 1905, Baku was the scene of sanguinary conflicts between the Armenian and Tatar populations. During the rioting the oil industry suffered immense damage. The total loss, direct and indirect, to the different concerns amounted to tens of millions of rubles. The commercial and industrial section of the town was almost entirely destroyed. Consult: Marvin, *The Region of Eternal Fire* (new ed., London, 1891); Louis, "The Baku Petroleum District," in the *Engineering Magazine,* no. xv (New York, 1898); Henry, *Baku: An Eventful History* (1906).

**BAKU.** A government of the Russian viceroyalty of the Caucasus. Area, 15,061 square miles; pop., as estimated Jan. 1, 1911, 1,033,700 (274,100 urban, 759,600 rural). Capital, Baku (q.v.). It is classed as a Transcaucasian government, though its northern part extends beyond the Caucasus Range. It is of importance largely on account of its oil wells. These are principally located in the vicinity of the city of Baku, into which the oil is piped and where it is prepared for export. This district is the most prolific single district in the world and the principal source of Russia's supply. The output in 1901 was 671,000,000 poods, the entire Russian output 706,000,000; in 1908, 467,000,000 poods (525,000,000 for all Russia); in 1909, 490,000,000 (557,000,000); in 1910, about

479,000,000 (about 573,000,000). The average output per well in 1910 was 188,000 poods, 186,000 in 1909, 187,000 in 1908, 351,000 in 1901. The decline is due to the gradual decrease in the quantity derived from spouters (15,000,000 poods in 1910, and 98,000,000 poods in 1901); to the decrease in the average output per well; and to the increased depth of the bore holes together with a decrease in the number of holes bored per annum. The output from the island of Tcheleken (about 20,000,000 poods) is shipped to Baku, but is not included with the Baku production.

**BAKUBA,** bä-kōō'bä. A Bantu-speaking people living in the Kasai District of the Congo, who have recently been described under the name of "Bushongo"; they are related to the Baluba. The Bakuba are distinguished among all the Congolese tribes by the high development of their æsthetic sense. They are admirable wood carvers, decorating goblets, toilet boxes, drums, and in fact all kinds of wooden objects with characteristic plait patterns. The most remarkable product of their industry, however, is the plush-like pile cloth woven of raffia-palm fibres by the men and decorated with designs sewed on and trimmed down by the women. Visited and briefly described by the early travelers in the Kasai region, the Bakuba have been more recently studied by Frobenius and Torday. The latter and Joyce have collaborated in the most authoritative account hitherto published, *Les Bushongo* (Publications of the Tervueren Museum, Belgium, 1911). Some valuable data are to be found in Sir Harry Johnston's *George Grenfell and the Congo.*

**BAKUNIN,** bä-kōōn'yĕn, Mikhail (1814–76). A Russian agitator and writer, the founder of militant anarchism. He was a member of an aristocratic family, and after serving in the army from 1832 to 1838, traveled in Germany, where he devoted himself to the study of philosophy. His liberal tendencies had become marked even before he left Russia. In 1841 he was in close association with the leaders of the Young-German movement at Berlin, and in 1843 he appears as fraternizing with the Polish exiles in Paris. He passed a number of years in Switzerland, where he became prominent in communistic circles. In 1847 the Russian government demanded his return to Russia and upon his refusal confiscated his property. In the same year he was expelled from Paris upon the demand of the Russian authorities as the result of a violent speech in which he called upon the Poles and Russians to unite for the overthrow of the absolute monarchy. During the two years following he was plunged into the vortex of the revolutionary movement which was then convulsing all Europe. We find him at Berlin shortly after the outbreak of the March Revolution in 1848; in June of the same year he took part in the Pan-Slavic Congress at Prague and in the disturbances which followed, and in May, 1849, he was one of the leaders of the insurrection at Dresden and became a member of the Revolutionary government there. He was taken prisoner at Chemnitz and was condemned to death in May, 1850, but the Saxon government surrendered him into the hands of the Austrian authorities, by whom he was tried and again sentenced to death. At the request of the Russian government he was returned to Russia, where he was tried and for a third time sentenced to death. The sentence was commuted to life imprisonment by order of the Czar, and after several years in various fortresses Bakunin was sent to Siberia in 1855. In 1859 he was sent to the Amur region, whence he succeeded in making his escape on an American ship to Japan. Proceeding to London by way of the United States, he threw himself into the Socialistic movement, which was then making rapid progress under the leadership of Marx and Engels. In 1869 he founded the Social Democratic Alliance, which soon joined the International Workingmen's Association. By this time, however, he had become a believer in militant anarchism, and he attempted to impose his doctrines upon the association, whose policy was one of peaceful agitation. This led to his expulsion in 1872. In 1873 Bakunin retired from active life and spent the remainder of his days in Switzerland. He died at Bern June 13, 1876. A list of his writings, comprising mainly articles in newspapers and periodicals, covers 10 printed pages in Nettlau's *Bibliographie de l'anarchie* (Paris, 1897).

**BAKWIRI,** bä-kwē'rē. A Bantu tribe of Kamerun, of medium height, well proportioned, and with regular features. Cannibalism was formerly practiced. Drum signaling is much used. The code admits of carrying on sustained conversations, and news is rapidly conveyed to long distances. Witchcraft, ordeals, and sacrifices prevail.

**BALAAM,** bā'lam. A seer, and the hero of a remarkable story told in connection with the conquest of Palestine by the Hebrews. The main narrative is found in Num. xxii.–xxiv. At the instance of Balak, King of Moab, Balaam is said to have left his home at Pethor to pronounce a curse upon Israel. He at first declined (xxii. 13), but on the second call was allowed by God to go, though with the instruction to speak only what God should tell him. In reality, however, God was angry with Balaam because he went, and manifested his displeasure by sending an angel with drawn sword to block up Balaam's path. While Balaam himself did not notice the angel, his ass saw him and tried to turn aside. Driven back into the road, the ass pressed so closely against the mountain wall that Balaam's foot was crushed. The angry seer continued to beat his ass until God opened the mouth of the ass, and she spoke to Balaam, rebuking him. Then his eyes were opened, and he saw the angel, who permitted him to go on, with the understanding that he was to speak only such words as were put upon his lips. He was received by Balak at Kiriath-huzoth and taken to the shrines of Baal. At Balaam's order seven altars were prepared and seven oxen and seven rams sacrificed. Then Balaam prophesied, but God put a word of blessing in Balaam's mouth instead of a curse. A second and a third time Balak prepared altars and offered sacrifices, but each time Balaam blessed Israel. When rebuked for this by Balak, he answered that he must obey the commands of God. The seven oracles prophesy (1) Israel's greatness (xxiii. 7–10); (2) Israel's conquering power (xxiii. 18–24); (3) Israel's prosperity, with a king greater than Agag; (xxiv. 3–9); (4) Israel's king, the star coming forth from Jacob, who will smite Moab and Edom (xxiv. 15–19); (5) the destruction of Amalek (xxiv. 20); (6) the capture of the Kenites by the Ashurites (xxiv. 21 f.); and (7) the end of another people, probably the Amorites, who afflicted Asher and

Eber (xxiv. 23 f.). According to Num. xxxi. 16, Balaam counseled the women of Midian to cause the Israelites to commit trespass against Yahwe; as a punishment he was slain with the Midianites (Num. xxxi. 8; Josh. xiii. 22).

As to the home of Balaam, Num. xxii. 5 declares that he came from the land of the sons of Ammon (so Heb. MSS., Jerome and Syriac), but this may be a gloss occasioned by the absence of an oracle against Ammon. "Pethor on the river" has been understood as referring to Pitru on the Euphrates, and Aram to Mesopotamia; but the river is not necessarily the Euphrates; the similarity between the Hebrew letters *r* and *d* has often caused a confusion of Aram and Edom, and Balaam is not likely to have been represented as coming a distance of 20 days' journey, or through the country occupied by Israel to the southern end of Moab. Balaam ben Beor is believed by many scholars to be identical with Bala ben Beor, the first King of Edom according to Gen. xxxvi. 32. Attempts have been made by critics to assign different parts of the narrative to two sources, but they have not been very convincing. Balaam is nowhere represented as friendly to Israel, and, in the present condition of the text, it is not possible to use the alternation of the divine names as a criterion, or to put stress upon the apparent inconsistencies between xxii. 20 and xxii. 22. The episode of the talking ass adds to the charm of the story and, like so many an animal fable, teaches a very wholesome lesson. That animals may be conscious of the presence of a spirit when men fail to recognize it is a widespread idea (cf. Wellhausen, *Reste arabischen Heidentums*, pp. 151, 201, 2d ed., 1897). From the statement in Deut. xxiii. 5 f., that "Yahwe was not willing to hearken unto Balaam, but changed the curse into a blessing," Bertholet infers that Balaam was supposed actually to have cursed Israel, but without effect. It is possible that this passage alludes only to Yahwe's unwillingness to hear from the lips of Balaam a curse of his people Israel and a consequent change by the divine afflatus of an intended curse into a blessing. A conception of the inherent efficacy of the prophetic curse or blessing clearly underlies the whole story. Nevertheless the earliest tradition may have known only that the *hija*, or "curse," which formed so important a preparation for, and accompaniment to, the actual fighting was pronounced by the King of Edom and Midian. The later success of Israel showed the futility of any such curse and paved the way for the conviction that no curse could have been uttered, but only words of praise. A gifted poet in Israel answered the natural question as to what these words must have been. He probably lived in the Davidic age, as his allusions to the great King, his victories over Edom and Moab, and the discomfiture of nations like the Kenites and the Amelekites that still existed at his time seem to indicate. In later times Balaam became the type of the prophet uttering his oracles for hire and the heretical teacher. Consult A. v. Gall, *Zusammensetzung und Herkunft der Bileamperikope* (1900); Holzinger, *Numeri*, pp. 104 ff. (1903); Bertholet, *Die Religion in Geschichte und Gegenwart*, vol. i, pp. 1248 ff. (1909); N. Schmidt, *The Messages of the Poets*, pp. 327 ff. (1911).

**BALAAM.** The name under which the Earl of Huntingdon is satirized in Dryden's *Absalom and Achitophel.*

**BAL'ACHONG** (Malay *bālachān*). The name given by the Chinese to a condiment eaten with rice, made of putrid shrimps or small fish pounded with salt and spices and then dried.

**BALAFRE**, bȧ'lȧ'frȧ', LE (Fr. the scarred). 1. A name applied to Ludovic Lesly, uncle of Quentin, in Scott's *Quentin Durward*, because of his scarred cheek. 2. A characterization of two dukes of Guise for a similar reason.

**BALAGUER Y CIRERA**, bä'lä-gär' ē thē-rā'rä, VÍCTOR (1824–1901). A Spanish poet, historian, and statesman; born and educated at Barcelona. He was archivist and afterward professor of history in the university there. For the 25 years following 1843 Balaguer was head of the Liberal party in his native city. His political views were advanced through the medium of *El Conseller*, a paper which he owned and edited. Although intensely regional in his sympathies, he was not a separatist. He was made Minister of Public Works in 1872, Vice-President of the Cortes in 1880, and successively Minister of the Colonies and Minister of Finance, and later a life Senator. A special study of the history and legends of Catalonia was made by him. A writer of plays which were produced in Barcelona while their author was still in his teens, and of verse more popular than original, he frequently used the pseudonym "el Trovador de Montserrat." His influence upon the literary renaissance in Catalonia was very great, and no one did more than he in the establishment of the Floral Games (*Juegos Florales*) that so powerfully aided this movement. In 1891 he published his great epic trilogy, *Los Pirineos*, which has been translated into Italian, and into German verse for the stage. This work inspired the Spanish composer Felipe Pedrell to create a lyric drama for which Balaguer made the special libretto. During the last 15 years of his life he devoted much of his time and most of his wealth to establishing and equipping a library and museum at Villanueva y Geltrú, which he left heavily endowed in his will. He was a member of the Royal Academy of History (1875) and of the Spanish Royal Academy of the Language (1883) and possessed the Grand Cross of the Order of Carlos III. Among his more important works are: *Estudios históricos y políticos* (1876), *Historia de Cataluña y de la Corona de Aragon* (1860–63), *Historia política y literaria de los trovadores* (1878–80), *Tragedias* (1879), and *Poesías completas* (1884).

**BALAHISSAR**, bä'lȧ-hĭs-sär' (Turk. and Ar. *bala*, high + *hissar*, castle). A village of Asiatic Turkey, situated about 8 miles southwest of Sivrihissar, in the vilayet of Angora (Map: Turkey in Asia, D 3). Near by are ruins of the ancient Pessinus, a flourishing town of Galatia, famous for the worship of Cybele, to whom a fine temple was built by the kings of Pergamum. The people of Sivrihissar use this region as a quarry, and the ancient ruins are fast disappearing.

**BA'LAK.** A caricature of Dr. Burnet, Bishop of Salisbury, in *Absalom and Achitophel*, by Dryden and Tate. He appears in part ii.

**BALAKIREFF**, bȧ-lä'kē-ryĕf, MILI ALEXEYEVICH (1837–1910). A Russian composer and founder of the Young Russian school of music. Ulybysheff (Oulibicheff) was his first teacher in music at his native city, Nizhni-Novgorod. Of exceptional memory, he knew at the age of 18 nearly all the classics of music by heart.

In 1855 he graduated from the mathematical department of the University of Kazan and went to St. Petersburg, where Glinka befriended him. He made a brilliant début as a pianist, but gave up that career; nor could Ulybysheff's Mozart worship make a classicist of him. Russia was reawakening, after the Crimean War, from her enforced torpor during the reign of Nicholas I, and Balakireff gathered around him several youthful enthusiasts, Cui, Mussorgski, and later Rimsky-Korsakoff and Borodin, all striving for nationalism in music, with Glinka and Dargomyzhski as their models. The foundation of the Modern Russian school was now laid. Under the energetic guidance of Balakireff they studied all the masters of music from the earliest times. He possessed a striking power of analysis as well as of imparting knowledge, and he taught them whatever he learned himself. "Truth and nationalism" was their battle cry. At first in literary articles, then in musical compositions, they embodied their theories. Balakireff's own contributions to this movement were *Songs* (1858–60); three overtures (on Russian themes, 1858; on Czech themes, 1867; and the Millennial, 1862); incidental music (overture, march and four entr'actes) to *Lear* (1858–61); a collection of 40 *National Songs* (1866); and a piano fantasy, *Islamey* (1869). The songs have remained a classic in their national treatment of the added accompaniments, and the fantasy has been pronounced the most difficult piano composition. It was a favorite of Liszt's, and one which all his pupils had to learn. Jointly with Lomakin, Balakireff founded, in 1861, the *Free Music School*. In its classes the "new truths" were inculcated, at its concerts the works of the Young Russian school were performed, under Balakireff's passionate baton. In 1867 he gained a European reputation by his production and conducting of Glinka's *Ruslan and Lyudmila* in Prague. On his return he was elected conductor of the Russian Musical Society, but resigned in 1869 on account of intrigues, and in 1872 withdrew from public life owing to ill health. From 1883 till 1894 he was director of the Imperial Capella, which he has placed on a solid musical foundation by organizing classes in various branches of musical instruction. His fantasy for orchestra, *Tamara* (1867–82), and his symphony in C major (1898) are his greatest works. They are growing, passionate, and full of rich orchestration. All his larger works are programme music of the Berlioz-Liszt school. Though not prolific, he occupies, in the history of Russian music, one of the most distinguished places. Consult Cui, *La musique en Russie* (Paris, 1880), and Pougin, *Essai historique sur la musique en Russie* (Turin, 1897).

**BALAKLAVA**, bă'lȧ-klä'vȧ. A small port in the southwest of the Crimea. It is separated by a rocky peninsula from the harbor of Sebastopol, from which it is about 6 miles distant. The harbor, which affords secure anchorage for the largest ships, is perfectly landlocked, the entrance being so narrow as scarcely to admit more than one vessel at a time. Balaklava is the Portus Symbolorum of the ancients, and the present name is supposed to be a corruption of the Italian *Bella-chiava* ('fair haven'). It was long the seat of a Greek colony. In the fourteenth century it fell into the hands of the Genoese, who have left behind them the interesting ruins of a fortress on a rock overlooking the bay. They were expelled in the fifteenth century by the Turks. On the acquisition of the Crimea by Catherine II of Russia it was made a military station. In 1854 the town was occupied by the British, under Lord Raglan. Here an inefficient commissariat allowed great numbers of the troops to starve to death in the midst of bountiful supplies rendered inaccessible by official red tape. The name "Balaklava" is probably best known to English peoples in connection with the charges of the Heavy and the Light Brigades (Oct. 25, 1854), the latter made famous by Tennyson's poem. To-day, in spite of its splendid harbor, the town has a population of only about 1500, mostly Greek fishermen. The surrounding country is devoted to grape growing.

**BALALAIKA**, bă'lȧ-lī'kȧ. A popular Russian stringed instrument. It consists of a triangular (rarely, oval) body and a rather long neck with frets. Formerly it had only two strings; now the usual number is three, although there are also instruments with four strings, which are plucked with the finger. The Russian peasants use it in the accompaniment of their folk songs. In recent years W. W. Andreeff has improved the quality of the tone and organized at St. Petersburg a regular balalaika orchestra of 30 instruments, which he has taken on tours through Europe, rendering only Russian folk music. The organization visited America in 1910 and in succeeding years with great success.

**BALAMBAN.** A pueblo on the west coast of Cebu, Philippines, about 23 miles northwest of the town of Cebu, on the Strait of Tanon. It has a well-sheltered harbor, an active coast trade, and a population of about 13,000.

**BALA MURGHAB**, bä'lȧ mo͝or-gäb'. See MURGHAB.

**BALAN**, bȧ'läN'. An early poem, a later rendering of which was *Fierabras*, one of the most popular tales of the Charlemagne cycle. An English version of *Balan* was *The Sowdan of Babylon*. In the latter romance Balan is the name of the father of Fierabras. He was overcome by Charlemagne. The Arthurian character, Balan, was the brother of Balin.

**BAL'ANCE** (Lat. *bilanx*, having two scales, from *bis*, twice + *lanx*, plate). An instrument used for the comparison of two masses or, speaking less technically, for ascertaining the weight of a body. The balance in its essence is simply a lever (q.v.) or beam poised or suspended so as to move freely about an axis transverse to its length. The force acting on one arm of the lever is produced by the action of gravity on the body whose weight is to be determined, and is equal to its mass $m$ multiplied by $g$, the acceleration due to gravity. (See MECHANICS.) If the lever is in equilibrium, or the beam at a horizontal position, there must be a force equal, but opposite in direction, acting on the other arm at an equal distance, and as the acceleration due to gravity is a constant for any one point on the earth's surface, and as the arms of the lever are equal by construction, the mass of known magnitude upon which gravity acts must be equal to the mass of the unknown body. If the arms of the balance are unequal in length, it follows, from the law of the lever, that the masses are inversely as the length of the arms. The balance, accordingly, enables us to learn the actual mass of a body by direct comparison with a standard of mass. The spring balance (q.v.), on the other hand, measures the weight or attraction exerted by the earth on a body, and as the

force of gravity varies from point to point, the force acting on the spring must vary with the place. The mass of the body which is being weighed is constant, so that the amount that the spring is stretched depends upon the acceleration due to gravity.

From the foregoing considerations it will readily be seen that there are two methods which

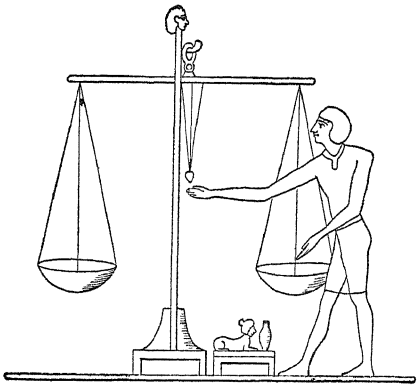


FIG 1.

may be followed in the construction of a balance: Either to make the arms equal in length, and then find the number of weights of known value which will produce equilibrium, as in the case of the ordinary balance; or by having a known constant weight whose position, and consequently the effective length of the arm on which it is suspended, can be varied at will, as in the case of the steelyard. These facts were early known, and the balance is one of the first instruments to be used for measurements, having been employed by the ancient Egyptians, as the accompanying illustration testifies, and by other nations of antiquity. The steelyard played an important part in the ordinary commercial transactions of the Romans, and interesting specimens of these balances and their weights have survived which show few if any important variations from the ordinary steelyard of the present.

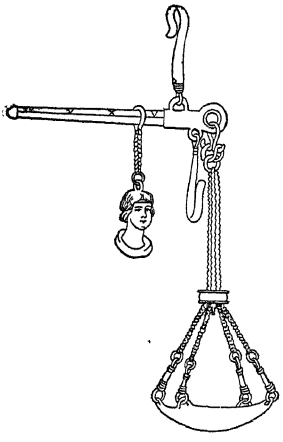


FIG. 2.—ROMAN STEELYARD.

Considering the simple balance, it is found that its first essential is that the arms should be equal, so that when once there is equilibrium the known and unknown weights may be interchanged without disturbing this condition. Otherwise the balance is false, and the weight obtained is not correct, being too great if the standard or known weights are placed in the short pan, and vice versa. Then, as it is necessary that the beam should move freely, there must be a proper mounting or suspension where friction is reduced to a minimum, and as the force of gravity acts vertically, both known and unknown weights must be carried in suitably suspended pans.

The balance is an instrument whose use is susceptible of great accuracy, and this is attained in the balances used by physicists and chemists in their measurements of precision. While the theoretical considerations involved are of course applicable to all forms of balances, they become of greater significance in discussing these finer instruments where extreme accuracy is desired. In such a balance the beam is of metal and carries at its middle point, transverse to its length, a steel or agate knife-edge which rests on surfaces of similar material. The line of contact between the knife-edge and the plane is the axis around which the beam revolves; and when the beam is at rest a vertical line through the centre of gravity would include this knife-edge. Connected with the beam, as shown in the illustration, Fig. 3, is a fine pointer, which passes over a graduated scale at the base of the supporting pillar, while at or near its extremities are placed, at equal distances from the central knife-edge, knife-edges upon whose sharp edges, turned upward, are placed the bearing surfaces of the

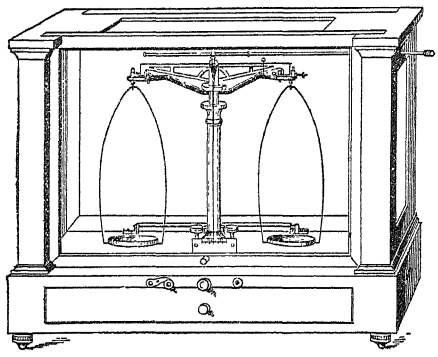


FIG. 3.—ANALYTICAL BALANCE.

metallic pieces from which the pans are suspended. In order that a minimum of wear should come upon these sharp edges, mechanism is provided to support the beam and pans whenever there is no actual weighing, and the devices to accomplish this vary in different forms of balances. The beam is graduated into 10 equal divisions, which in turn are similarly subdivided, and a hook on a movable rod is provided, by means of which a fine loop or rider of wire can be placed and removed at any desired point on the beam. Such is a general description of a balance, though there are, of course, numerous mechanical modifications and refinements to insure facility of operation and accuracy of measurement. The underlying principles will perhaps better be understood by referring to the diagram, Fig. 4. Let *ACB* represent the beam of a balance, and let the points where the knife-edges intersect a vertical plane through the beam be located on the line *ACB*, though this condition in practice is not always realized, and the knife-edges at the end of the beam may be either higher or lower than the centre knife-edge. The point of support is at *C*, consequently the centre of gravity is situated at *C* on a vertical line passing through this knife-edge. The location of the centre of gravity of the beam is an important consideration. If it were above the point of support, the beam would be in unstable equi-

librium and would seek a more stable position and in so doing would overturn. If the centre of gravity coincided with the axis of revolution, the beam would rest in any position indifferently, while the stability increases with the distance of the centre of gravity below the point of support. With an increase in the stability of the beam, the less the sensitiveness of the balance and the quicker the time in which it will cease from oscillating and take up a position of rest. The sensitiveness also depends on the length of the arms, increasing with the length, and the ease, or lack of friction resulting from skillful construction, with which the beam oscillates. The more sensitive the balance the larger the period of oscillation of the beam, though it is necessary to consider the time necessary in making a weighing, and not adjust an ordinary balance to too high a degree of sensitiveness. An ordinary fine balance, as used by the physicist or chemist, is constructed and adjusted to have a period of vibration of between 10 and 15 seconds.

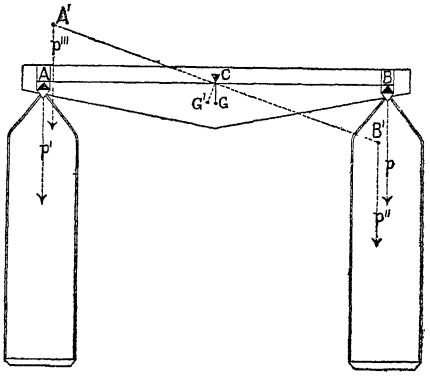



FIG. 4.

Assuming that the arms are equal in length and that equal loads are carried in each pan, or, in other words, that the beam is in equilibrium, the forces denoted by the dotted lines $p$ and $p'$, acting vertically, are of course equal. If now a small excess of weight be added to the right-hand pan, there will be an increased force on the right-hand arm, which may be represented by $p''$, and the beam will be deflected by an amount which for small additions of weight is proportional to the excess and is of course indicated by the pointer and scale.

In using a fine balance, precautions must be observed in its care and manipulation. The balance, which is inclosed in a glass case and kept free from dust, is first leveled in order that the supporting pillar should be vertical. If the pointer of the balance is not at the middle point, or zero (many physicists prefer to renumber the scale so that the numbers run consecutively from the left to the right, instead of the usual arrangement where the divisions are numbered to right and left from the centre mark) i.e., the zero or point of rest of the balance does not coincide with the zero of the scale, the true zero must be determined by taking the mean of an even number of swings on one side, and an odd number on the other, and then their mean. The body is placed in one of the pans while both pans and beam are supported. In the other are placed the weights, the usual practice being to begin with the larger weights and work toward the smaller. The weights are of brass, platinum, or aluminium, the smaller weights being in the form of pieces of sheet metal and "riders" of fine wire. The pans and beams should always be supported while the weights are changed. After the approximate weight of the body is ascertained, so that the addition of a centigram will cause the pointer to come to rest on the opposite side of the scale, the "rider" is brought into play and adjusted at such a position that the pointer comes to a rest at zero. A more rapid and usual method is that known as "weighing by swings," where points of rest when the weights differ by a certain small unit are obtained as described above. The amount to be added to the smaller amount of the weights will be such a fraction of the small units as will be obtained by taking as the denominator the number of scale divisions between the two rest points, and as the numerator the distance of the true zero from the first point. It is often convenient with such a balance to have a table of sensitiveness, from which one can tell at a glance the number of milligrams corresponding to a scale division for any given load. The experimenter can also find the ratio of the two arms of the balance and use it as a correction factor, as well as determine the errors of the set of weights in order to refine his measurement. He should, in addition, take into consideration the amount of air displaced by weights and the body being weighed, particularly if their densities differ considerably. An analytical or assay balance will have a sensitiveness of 1-50 or even 1-400 of a milligram, and is used in chemical analyses for the exact determination of the mass of various substances, though a sensitiveness of one-half milligram suffices for many ordinary analytical purposes. In the use of the balance there are many methods, complex and exact, which are used by the physicist, and which will be found described in the more advanced treatises on experimental physics.

Probably the most accurate use of the balance is at the International Bureau of Weights and Measures at Sèvres, near Paris, where the standard kilograms constructed by the bureau are preserved and compared. Here the balances are of great sensitiveness, and are operated by an observer in an adjoining room, who uses a telescope to observe the deflections. There is automatic apparatus to change the weights from one pan to another, and the temperature is maintained constant.

Balances are constructed in many forms for various purposes where it is not at all necessary to employ such refinements as have been described. Those of the apothecary or grocer are familiar examples, while the balance for weighing bullion combines large capacity with considerable sensitiveness. In small balances use is sometimes made of the bent lever, especially in balances for weighing letters, chemicals, and other small objects. Here a constant weight is placed on the short or bent arm, and the body of unknown mass on the long arm. A pointer on a graduated scale indicates the weight of the body. The graduations are not even, as the angular displacement from a position of equilibrium does not increase proportionately with the increase of weight.

**Bibliography.** For a description of ancient balances, consult Gerland and Traumüller, *Geschichte der physikalischen Experimentirkunst;* and Sokeland, "Ancient Desemers or Steelyards,"

in the *Smithsonian Annual Report for 1900* (Washington, 1901), translated from the *Verhandlungen der Berliner Gesellschaft fur Ethnologie* (Berlin, 1900). For a description of the manipulation of a balance in fine measurements, the reader should consult Kohlrausch, *Lehrbuch der pratischen Physik* (Leipzig, 1905), or his more elementary *Kleiner Leitfaden der praktischen Physik* (Leipzig, 1900). An excellent systematic treatise is Felgentraeger, *Theorie, Konstruktion und Gebrauch der feineren Hebelwage* (Leipzig and Berlin, 1907), as is also Braver, *Die Construction der Waage*, 3d ed. by Lawaczek (Leipzig, 1906); Stewart and Gee, *Lessons on Elementary Practical Physics*, vol. i (London, 1889), and Glazebrook and Shaw, *Practical Physics* (London and New York, 1893), give excellent descriptions of the theory and manipulation of balances, which also will be found discussed at considerable length in the larger treatises on practical physics. The publications of the International Bureau of Weights and Measures describe the method of testing standard kilograms and the balances used by the bureau.

**BALANCE**, and **BALANCE SPRING.** The balance of a watch is a wheel finely poised on its axis; the pivot holes in which it turns being frequently—in chronometers and clocks, as well as in watches—jeweled, or made of small rubies, diamonds, etc., for the sake of durability. The natural effect of an impulse given to such a wheel would be a complete rotation on its axis. This, however, is convertible, by the escapement (q.v.) and by the balance spring, into a vibratory motion. The balance spring is held to be a crowning invention in the mechanism of the watch; and the honor of its first suggestion has been claimed for no less than three very eminent men—Hooke, an Englishman; Abbé Hautefeuille, a Frenchman; and Huygens, the Dutch astronomer. The honor, however, is thought to belong to Hooke, who applied for a patent for the invention in 1658 or 1660.

The balance spring consists of a coil of fine steel wire which determines the time of vibration of the balance. One of its extremities is fastened to a point independent of the balance, while the other is attached near its axis. When the balance is at rest, the spring is not under tension, its position being called the point of rest; but when an impulse is given to the balance by the crown wheel of the escapement, the balance moves around just so far as the impulse given is able to overcome the elastic resistance of the spring. When that resistance becomes equal to the impulse given, the balance stops for a moment, and then is driven back by the elastic recoil of the spring, and continues thus to vibrate so long as the impulse is repeated or the watch is in motion. The subject of balances and balance springs and their adjustment is treated at considerable length in Britten, *Watch and Clockmakers' Handbook* (London, 1896). For a general description of watchmaking and for illustration of the balance wheel, see CLOCK and WATCH.

**BALANCE OF POWER.** An expression used in diplomacy, with reference especially to the European Powers, to denote a condition of affairs in which no one state is permitted to have such a preponderance as to endanger the independence of the others. This idea is not confined to modern times. The Greek states acted upon it by a kind of instinct of self-preservation, though it was not directly formulated. It has, however, been more distinctly avowed as a motive of political conduct, and more systematically acted upon since the time of Charles V, whose ambitious designs awakened the European Powers to the danger of such overwhelming preponderance in one dynasty. The motive of preserving the balance of power came first distinctly into the foreground in those alliances which England, Holland, and Austria repeatedly formed against the schemes of Louis XIV. It was the same cause that broke up the most powerful of these coalitions; for in the War of the Spanish Succession, when the Hapsburg candidate for the Spanish throne became, by the death of Joseph I, sovereign of Austria and Holy Roman Emperor, and the power which, in the hands of Charles V, had menaced the equilibrium of Europe, seemed likely again to be wielded by one man, England withdrew from the coalition and saved Louis from a decided overthrow. The kaleidoscopic changes in political alliances that characterized European history from the Treaty of Utrecht to the end of the Seven Years' War were the result of a frantic attempt on the part of continental statesmen to preserve the balance of power. The aggressions of Napoleon called all the powers of Europe to arms against him in the name of the balance of power; and in readjusting the map of Europe the balance of power was often invoked to cover the jealousy which resisted claims to restitution of territory. For some time the balance of power in Europe has been embodied, as it were, in a hexarchy or permanent congress of the six Great Powers—Great Britain, France, Germany, Austria, Russia, and Italy. Mutual jealousy among the leading Powers, on the score of extension of boundaries, is looked to as the great safeguard of the smaller states. After this manner the Crimean War arose out of Russia's renewed attempt to extend her dominion over Turkey. It was in the name of the balance of power that the nations, in 1878, at the Congress of Berlin, deprived Russia of many of the advantages she had gained by the Treaty of San Stefano. Within the last 30 years, however, the balance of power has encountered an opposing principle in the rising spirit of nationalism. It is now generally recognized that countries may no longer be carved arbitrarily into morsels for the sake of preserving a political equilibrium, but that physical and social conditions must be taken into consideration as forces playing a part in the formation of states. United Italy, United Germany, and the Pan-Slavic spirit in Russia exemplify the growth of this political idea. On the other hand, a new phase of the old problem has been presented by the spread of European colonization and commerce in Asia and Africa. The balance of power has been in a measure extended over the whole world, and France, Germany, and Italy are everywhere seeking colonies and "spheres of influence" to balance the colonial empires of England and of Russia.

As a result of the Balkan War in 1912–13, the sudden rise to power of the Slav races at one time seriously threatened the political equilibrium of Europe and startled the courts of the Great Powers, but owing to rival ambitions and racial jealousies all fears of a Slavic preponderance were quickly dissipated and vanished when the Balkan states turned their arms against those of their own race.

**BALANCE OF TRADE.** A term applied to the difference between the value of the exports and imports of a country. This difference was formerly measured roughly, by the outflow or inflow of the precious metals in the settlement of accounts. When the exports exceeded the imports, causing an inflow of the precious metals, the balance was deemed favorable; in the contrary case, unfavorable. All of these expressions, which are still familiar, had their origin in the conception of political economy dominant in the so-called mercantile period. (See POLITICAL ECONOMY.) It was one of the fundamental errors of that system to confound the wealth of nations with their stocks of precious metals, and the economic policy of the period zealously favored anything which seemed to increase the stock of the precious metals, and as sweepingly condemned whatever had an opposite tendency. It will be readily understood how upon such principles the attainment of a favorable balance of trade became the chief end of commercial policy. Various measures were adopted to secure this end and led to the manifold restrictions upon commerce which characterize peculiarly the eighteenth century.

With the spread of the notions of economic freedom and the gradual adoption of a more liberal if not an absolutely free-trade policy in commercial affairs, the "balance of trade" lost its commanding place in economic doctrine. But it remained for a long time, and is to-day, a frequent popular criterion of national prosperity. Apart from the importance thus ascribed to the balance of trade, there is doubtless the feeling that a nation which imports more than it exports must pay the excess from its accumulations and thus gradually become impoverished. But if it be true that a people living upon its accumulations is on the road to impoverishment, it is by no means true that an excess of imports over exports is evidence of such a fact.

Whatever its bearing upon the national welfare, there could be no doubt that under the simpler conditions of a century ago an excess of merchandise exports over imports was an adequate explanation of an inflow of the precious metals. This would still be true if current sales and purchases were the only economic relations that bound peoples together. But this is far from being the case. In addition to movements of goods we have movements of debts (bonds, stocks, etc.), and movements of services (freights for transportation), between the nations. Any inequality in the movement of goods may be compensated, not only by payments of gold and silver, but by transfers of indebtedness or the performance of services. Indeed, the last two factors may be of such importance as to determine a movement of gold exactly contrary to what the merchandise movement might lead us to expect. Thus the United States, in the fiscal year 1912, with an excess of merchandise exports over imports of $551,057,475, had exports of gold exceeding imports by $8,391,848. In the United States an excess of merchandise exports, and in Great Britain an excess of imports, may be said to be normal conditions of trade. Since it thus appears that the balance of merchandise exported and imported no longer explains the phenomena of international payments, the scope of the phrase "balance of trade" has sometimes been extended to include the balance of international settlements. But in so doing the phrase once clear and distinct becomes involved and uncertain. It seems better to confine it to its original meaning to indicate one factor of modern commercial relations, and not the substance of them all.

It should be added that the practical determination of the balance of trade is beset with difficulties. Methods of determining the value of both exports and imports are necessarily crude, and it is not to be doubted that many of the false conclusions that have arisen in the discussion of trade balances have had their origin in the defects of commercial statistics. No analysis of trade returns can truthfully do more than indicate broad general tendencies without an examination into the methods by which such returns are prepared.

**BALANGA,** bä-läng'gä. The capital of the province of Bataan (436 square miles; pop., 45,166), on the island of Luzon, Philippines (Map: Luzon, D 5). It is on the west coast of Manila Bay, 34 miles northwest of Manila. It is a telegraph station, and its location on a shore road makes it an important point. It is well built and has a government house, a city hall, and a prison. Irrigation from the river Talisay is carried on to a considerable extent. Pop., 1903, 7347.

**BAL'ANOGLOS'SUS** (Gk. *βάλανος, balanos,* acorn, gland + *γλῶσσα, glōssa,* tongue). A remarkable worm-like invertebrate animal, now generally regarded as in some way related to the probable ancestral form of the vertebrates. Two or three genera form the sole family of the order Enteropneusta and the class Hemichorda (or Adelochorda). The body is long and slender and, some distance in front of the middle, is banded by an elevated ring, called the collar, from the front of which springs the somewhat tongue-shaped proboscis. (See illustration on Plate of ASCIDIANS, ETC.) Back of the collar, on each side of the body, are series of vertical slits opening through both the body wall and the wall of the alimentary canal. Water taken into the mouth passes out through these openings and aërates the blood. The slits therefore function as gill slits; and they are supported by "chitinous" rods, like the gill arches of *Amphioxus.* Projecting forward from the anterior upper side of the œsophagus is a short cartilaginous rod, which helps support the proboscis. This apparently corresponds to the notochord of the embryo of the higher vertebrates, and, because of its incomplete condition in *Balanoglossus,* the name "Hemichorda" is given to the class.

The species of *Balanoglossus* (and allied genera) are found buried in the sand of the seashore in shallow water in various parts of the world. They have been taken on both coasts of America, on the Pacific coast, north to Alaska, on the European side of the Mediterranean, in the East Indies, in the Bahamas, and on the south shore of Jamaica. Most of the known species are small and dull-colored, but some of the West Indian species are over a foot in length and half an inch in diameter, and are brightly colored with red and yellow. There are generally little heaps of excrement about the entrance to the holes in which *Balanoglossus* lives. All the species have a musky odor, which is strong enough to indicate their presence to any one familiar with the smell. Sometimes it is so strong as to be highly disagreeable. Many of the species have a complicated metamorphosis in their development, the pelagic bell-shaped

larva being known as a tornaria. It resembles superficially the larval form of some of the echinoderms, and for that reason some zoölogists have sought for evidence of relationship between that group and the Hemichorda. It is generally believed now, however, that the nearest living relatives of the Hemichorda are to be looked for among the Ascidians. Compare AMPHIOXUS; CHORDATA. For illustrations, see ASCIDIANS.

**BALAO,** bä-lä'ō (Sp. to leap or dance). The name in the West Indies for the fishes of the family Hemiramphidæ, allied to the gars. See HALF-BEAK.

**BALAOAN,** bä'lou-än'. A town of Luzon, Philippines, in the province of La Unión, situated 26 miles north of San Fernando. Pop., 1903, 10,008.

**BALARD,** bà'lär', ANTOINE JÉRÔME (1802–76). A French chemist. He was born at Montpellier and died in Paris. He began his career as a pharmacist, but was subsequently appointed professor of chemistry at the Sorbonne and at the Collège de France, Paris. In 1868 he was made inspector-general of superior instruction. Balard carried out a number of interesting investigations both in pure and applied chemistry, but is best known as the discoverer of the element bromine, which he found in the mother liquors remaining after the extraction of common salt from sea water.

**BAL'AS** (Ar. *balakhsh,* a ruby from *Badakhshan, Balashan,* near Samarkand). The rose-red variety of ruby spinel (q.v.), called also rubicelle.

**BALASHOV,** bäl'à-shôf'. The chief town of a district, in the government of Saratov, Russia, on the left bank of the Khoper, a tributary of the Don, about 125 miles west of the city of Saratov (Map: Russia, H 4). Balashov has a considerable export trade in grain. Pop., 1885, 10,100; 1897, 12,200.

**BALASORE,** bäl'à-sōr' (Turk. and Ar. *bala,* high + *sore,* dwelling). The capital of the district of the same name in the Orissa division, Bengal, British India, near the Burabalang, which enters the sea to the west of the Hugli or Calcutta River, 118 miles southwest of Calcutta (Map: India, E 4). It has dry docks and, in spite of an obstructed harbor, maintains a coasting trade, which consists principally of exports of rice and salt, and imports of oil, metal, and cloth. Before the deepening of the Hugli it was a transhipping place for Calcutta sea trade. The town has been the seat, successively, of Portuguese, Dutch, and Danish factories. In 1846 the Danes sold their interest in the place to the English. Pop., 1901, 20,880; 1911, 21,362.

**BALATE,** bà-lä'tà. The name in the Philippines for a local holothurian (*Holothuria atra*), which is a favorite sort of trepang. Consult Jordana y Morera, *Bosquejo geográfico e historico-natural del archipelago Filipino* (Madrid, 1885). See TREPANG.

**BALATON,** bŏ'lŏ-tŏn, LAKE (Hung. for Ger. Plattensee). The largest lake in Hungary, about 55 miles southwest of Budapest (Map: Hungary, E 3). Its extreme length is 48 miles, with a breadth of from 3 to 10 miles, and an estimated area, including its frequently submerged marshes, of 420 square miles. Its depth is stated to exceed 100 feet near Tihany, although the average rarely goes beyond 25 feet. It is fed by numerous streams and springs and discharges its superfluous waters through the Sió, the Kapos River, and the Kapos Canal into the Danube. The southern bank is low, while the northern is bounded by vine-clad hills. The lake abounds in fish, notably in "fogas," a variety of perch which is considered a great delicacy in Germany and Austria-Hungary.

**BALAUSTION'S ADVENTURE.** A dramatic monologue by Robert Browning. The author's own fondness for Euripides is reflected in Balaustion's enthusiastic devotion to the humanest of the Greek tragedians. The Rhodian girl is one of the loveliest creations in English poetry. The poem was published in 1871 and was afterward continued in *Aristophanes' Apology.* See BROWNING, ROBERT.

**BALAWAT,** bä'là-wät'. A ruined city of Turkey in Asia, 10 miles northwest of Nimrud. Its Arabic designation is Jaqut Balâbâdh. It is the site of the ancient Imgur Bel, a fortified place built by Asurnazirpal II (885–860 B.C.) and his son, Shalmaneser III (860–825 B.C.). Asurnazirpal II began the construction of a fine palace which was completed by his successor. Among the most interesting relics recovered from the ruins are splendid bronze gates that opened into the vestibule. They are now in the British Museum. Consult Birch, *The Bronze Ornaments of the Palace Gates of Balawat* (London, 1880–81).

**BALAYAN,** bä'là-yän'. A seaport town of Luzon, Philippines, in the province of Batangas (Map: Luzon, D 11). It is situated at the northwest end of the Gulf of Balayan, 30 miles northwest of Batangas, has a good harbor, and vessels have made the town a base of supplies. The inhabitants are engaged in fishing, cattle-raising, agriculture, and coast trade. Pop. (1903) of town, 8493; of municipality, about 25,000.

**BALBEC.** See BAALBEK.

**BALBI,** bäl'bē, ADRIANO (1782–1848). An Italian geographer, born at Venice, who became successively professor of geography at Murano, professor of physics at Fermo, and a customs official in his native city. He published numerous works on geography and on statistics, most of which have been translated into the principal European languages. Among his works are: *Prospetto politico-geografico dello stato attuale del globo* (1808), *Atlas ethnographique du globe on classification des peuples anciens et modernes d'après leurs langues* (1826), *and Abrégé de géographie* (1838).

**BALBI,** GASPARO. A Venetian merchant of the sixteenth century, the first traveler who left an account of India beyond the Ganges. He made a 10-years visit to India. After his return he published, in 1590, the results of his travels in a volume entitled *Viaggio all' Indie orientali.* A Latin translation was printed in De Bry's *Collection of Voyages and Travels to the East Indies,* published at Frankfort in 1590–94. Balbi appears to have set down without exaggeration all that he himself saw and is particularly minute and exact concerning commercial matters, but there is scarcely any limit to his credulity with regard to what he heard from others. Having visited Goa and Cochin and other Portuguese settlements, he sailed for Pegu, then an independent empire, where he remained two years. His account of this last country is the most interesting of his narratives.

**BALBI'NUS,** DECIMUS CÆLIUS. One of the two emperors of Rome whom the Senate elected, on hearing of the death in Africa of the elder Gordianus and his son, in opposition to Maxi-

minus, who had the support of the legions in Germany. He was celebrated as an orator and a poet and was a man of mild disposition. His coadjutor, Marcus Clodius Pupienus Maximus (see PUPIENUS), was a bold and resolute soldier, who had risen from the people. They had reigned only a few months, during which time Maximinus had been killed by his own soldiers, who afterward submitted to Maximus, when they were both killed in 238 A.D. by the Pretorians, who at that time were animated by bitter hostility toward civilians and extended it to the rulers who had been elected by them.

**BALBO,** bäl'bō, CESARE, COUNT (1789–1853). An Italian statesman and historian, born at Turin. At the age of 18 he was appointed by Napoleon auditor of the Council of State at Paris; in the following year he became secretary to the commission sent to organize the province of Tuscany and continued for several years in similar service until the downfall of Napoleon. Thereafter he cast in his fortunes with the house of Savoy and entered upon a military career; but this also was soon interrupted by his being unjustly implicated in the Revolution of 1821. After three years of exile in France he returned home and gave himself up to historical studies. In 1843 appeared his *Delle speranze d'Italia*, whose chief contention was that national independence must precede the enjoyment of constitutional liberty. After freedom of the press was secured in 1847, he founded the *Risorgimento* in conjunction with Cavour. In 1848 he became president of the first constitutional ministry of Piedmont and from that time until his death, in 1853, retained a seat in the Chamber as one of the representatives of Turin. A conservative by temperament and training, his ideal was Italian unity and independence, so far as was consistent with the maintenance of the papal power, and this idea dominates all his writings. The more important of these include: *Storia d'Italia sotto ai Barbari* (1830); *Vita di Dante* (1839); *Meditazioni Storiche* (1842); and the posthumous works, *Della monarchia rappresentativa in Italia* (1857); *Sommario della Storia d'Italia* (1862). His historical novels (new ed., Leipzig, 1864) were popular in their day. The best *Life* of Balbo is by Ricotti (Florence, 1856). Consult also A. Vismara, *Bibliografia di C. B.* (Como, 1882), and G. Mazzoni, *L'Ottocento* (Milano). Selected works, edited by F. Nicolini, are now appearing at Bari (1913– ). *The Life of Dante* was translated by Bunbury (London, 1852).

**BALBOA,** bäl-bō'ä, VASCO NUÑEZ DE (1475–1517). A Spanish explorer, the first European to see the Pacific Ocean from American shores. He was born of a noble but reduced family at Jerez de los Caballeros. After leading a rather dissolute life in his youth he took part in the great mercantile expedition of Rodrigo de Bastidas to the New World. He established himself in Santo Domingo and began to cultivate the soil; but fortune proved adverse, and in order to escape from his creditors he had himself smuggled in a cask on board a ship and joined the expedition to Darien in 1510, commanded by Martín Fernandez de Encisco. An insurrection which took place obtained for Balboa the supreme command in the new colony. Confused accounts which reached him of a great western ocean impelled him, in 1513, to set out in quest of it. On September 25 of that year he obtained the first sight of the Pacific Ocean from a mountain top in the Isthmus of Panama. On the 29th he reached the water at the point which is still known by the name he gave to it, the Gulf of San Miguel, and took formal possession for Spain, naming the ocean the *Mar del Sur*, or South Sea, the coast at this point trending nearly east and west. His natural enthusiasm at this great discovery was shared by all the educated men of his time, and the descriptions of it by contemporary authors may still be read with much interest.

The governorship of the territories conquered by Balboa, and known as Darien, was obtained in 1514 by Pedro Arias (Pedrarias) Dávila, by means of his intrigues at the Spanish Court. Balboa resigned the command into the hands of the Governor, a narrow-minded and cruel man, and in a subordinate situation undertook many successful expeditions; but these, and all his other merits, only served to increase the hatred of Pedrarias Dávila toward him. The King recompensed Vasco Nuñez for his discoveries by appointing him *Adelantado del Mar del Sur* (the Pacific), and Governor of Panama, Coyba, and the lands he had discovered in the Pacific. The government of the mother country sought in vain to mediate between them, and Balboa even arranged to marry the daughter of Pedrarias. But on the first occasion of dispute which arose, Balboa, having been induced by Pedrarias to deliver himself up, was accused of a design to rebel, and upon evidence furnished by Garabito, the supposed friend to whom Balboa had intrusted his affairs, he was convicted and beheaded at Acla in 1517.

**BALBRIG'GAN** (Gael. Brecon's town, from *baile, bally*, place, town, fort). A seaport town of county Dublin, Ireland, 22 miles north of Dublin (Map: Ireland, E 3). Its principal manufactures are embroidered muslins, cotton, calico, and hosiery. The name "Balbriggan" has been used to describe varieties of cotton-knit goods prepared elsewhere. There is a little coast trade in grain and fish. Balbriggan is a favorite watering place. After the battle of the Boyne William III encamped here. Pop., 1901, 2236; 1911, 2273.

**BAL'BUS,** LUCIUS CORNELIUS. 1. MAIOR. A native of Gades (Cadiz), in Spain. After serving in the war against Sertorius he came to Rome and received the citizenship from Pompey. He was on terms of intimate friendship with both Pompey and Cæsar, especially with Cæsar. He helped to form the First Triumvirate, and, as a skillful financier, was chosen to look after Cæsar's property and interests during the latter's Gallic campaigns. In 56 B.C. his enemies and those of the triumvirs prosecuted him on a charge of illegally exercising the rights of Roman citizenship. He was defended by Cicero, in a speech still extant, and acquitted. Under Octavianus he was made Consul (40 B.C.)—the first time this honor had ever been conferred on one not born a Roman citizen. 2. MINOR. A nephew of the above. He, too, won Roman citizenship through Pompey. He served under Cæsar in Spain and in Africa, and was rewarded with the position of Pontifex. As Questor in Spain in 43 B.C., under Asinius Pollio, he used his office for fraud and oppression. Years later (21 B.C.) we find him as Governor in Africa, where he defeated the Garamantes (19 B.C.) and obtained a Roman triumph—a new honor for one not born a Roman citizen.

**BALCH,** bälch, EMILY GREENE (1867– ). An American economist and writer. She was born in Jamaica Plain, Mass., and received her col-

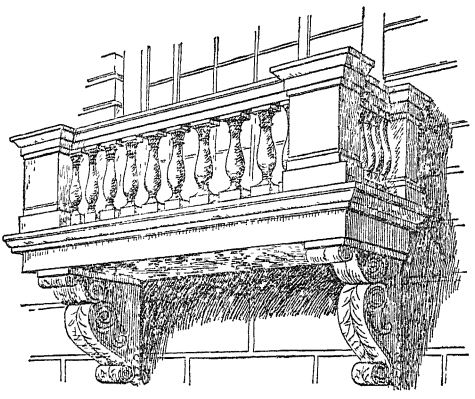
legiate education at Bryn Mawr. The year following her graduation in 1888 she spent in Paris in the study of political economy, and later she took special work at the University of Chicago (1895) and in Berlin (1895–96). In the latter city she was engaged in seminary work with professors Schmoller and Wagner. For a time she was connected with Denison House, a college settlement in Boston, and there also she was prominent in child welfare work. After being connected with the department of economics at Wellesley College for several years she was in 1903 made associate professor of economics and sociology. In 1908–09 she was a member of the Massachusetts State Commission of Industrial Education. Her writings include *Public Assistance of the Poor in France* (1893) and *Our Slavic Fellow-Citizens* (1910).

**BALCH,** GEORGE BEALL (1821–1908). An American naval officer, born in Tennessee. He entered the navy in 1837, studied at the naval school in Philadelphia in 1841–43, and participated in most of the naval operations of the Mexican War. In 1862 he was promoted to be commander, and subsequently, in command successively of the *Pocahontas* and the *Pawnee*, of the South Atlantic blockading squadron, distinguished himself by his operations on the Black and Stone rivers (Tenn.) and Togoda Creek (S. C.). He was commissioned captain in 1866, commodore in 1872, and rear admiral in 1878; was superintendent of the United States Naval Academy from 1879 to 1881 and was retired in 1883.

**BALCH,** THOMAS WILLING (1866–1927). An American lawyer and author, who graduated from Harvard in 1890 and from the law school of the University of Pennsylvania in 1895. He took up the practice of law in Philadelphia. The following works on international law are by him: *Some Facts about Alsace and Lorraine* (1895); *The Alabama Arbitration* (1900); *The Alaska Frontier* (1903); *L'évolution de l'arbitrage internationale* (1908); *La question de pêcheries de l'Atlantique* (1909); *The Arctic and Antarctic Regions and the Law of Nations* (1910); *La baie d'Hudson, est-elle une mer libre ou une mer fermée?* (1911; Eng. ed., under the title *Is Hudson Bay a Closed or Open Sea?* (1912).

**BALCONY,** băl′kŏ-nĭ (It. *balcone*, from *balco*, scaffold; Ger. *Balken*, beam). 1. A projecting platform in front of a window or of several windows on the outside of a private or public building, inclosed by a balustrade or parapet, and supported either by consoles and brackets or by supports rising from the ground. The balcony was occasionally used in Græco-Roman architecture, as is shown by several houses in Pompeii, by a temple at Baiæ, by ancient frescoes and reliefs, and by literary descriptions of the *mœniana* of Roman houses, but it did not become popular until the Middle Ages in the Orient and southern Europe.

Early wooden examples have perished; the finest remaining ones are the stone balconies in Italy, both in the communal palaces, where they served for public speeches and announcements (often called *ringhiera*), and in private palaces, such as those of Venice and Rome. In Italy they were usually uncovered, but sometimes, especially in France, they were surmounted by canopies, supported either on brackets or on columns rising from the balcony. Renaissance architects made an important feature of the balcony. In northern Europe, especially Switzerland and Germany, the structure was usually of wood and became a most picturesque part of houses and chalets. 2. The term is also applied to the gallery or stern walk outside of the stern of a large ship, and in theatres to the part between the dress circle and the gallery.



A VENETIAN BALCONY.

**BALDACHIN,** băl′dă-kĭn (It. *baldacchino*, a canopy, from *baldacco*, the Italian name of *Bagdad*, where the fabrics were manufactured). A term borrowed from the East and originally used of rich silks or brocades in the form of a canopy or tent-like or umbrella-like covering, such as were used in the East, either to place or carry over the heads of dignitaries or to pitch as tents. They formed an indispensable part of the court and traveling equipment of Byzantine and Mohammedan rulers and magnates, and were among the most sumptuous presents interchanged (e.g., that sent by Harun-el-Raschid to Charlemagne). Baldachins became well known in Europe through the Italian trade with Constantinople and the Mohammedan East, and also through the Crusades. Supported on four poles, they were carried over the heads of civil and religious dignitaries in all processions, coronations, marriages, religious rites, etc., and this custom is still continued in the processions of the Catholic and Greek churches. Fixed baldachins were used in royal and feudal throne rooms, in papal and episcopal halls, and over state tribunals: the term is also used for the canopies over state bedsteads. During the Renaissance, when the more purely architectural forms of the canopies over high altars, side altars, tombs, etc., were superseded by others of more pictorial type, the term "baldachin" was applied to these permanent structures of marble or metal, such as Bernini's famous bronze baldachin over the high altar of St. Peter's in Rome. In this sense the baldachin becomes practically identical with the *ciborium* (q.v.) over the tomb altar in early mediæval churches; but the word should probably be restricted to such examples as imitate the draped canopies above described.

**BALD COOT, BALD EAGLE,** ETC. See COOT; EAGLE; ETC.

**BALD CY′PRESS.** See CYPRESS.

**BALDE,** băl′dă, JAKOB (1604–68). A Latinist and poet, native of Alsace, who wrote in Latin. He was a Jesuit and for a time professor of rhetoric at Innsbruck (1628), and then at Ingolstadt (1635), and court preacher at Munich (1638–50) and at Neuberg (1650–68). He excelled as a lyric poet and was especially success-

ful as an imitator of Horace. Of his poems the following deserve mention: *Lyricorum Libri IV*, *Epodon Liber I* (1643); *Sylvæ Lyricæ* (1643); *Urania Victrix* (1663)—an allegory. Consult G. Eitner, *Jacob Balde's Leben und Charakter* (Breslau, 1863), and J. Bach, *Jakob Balde* (Freiburg, 1904).

**BALDER,** bąl'dĕr. A narrative poem by Sydney Dobell, written at Amberley Hill in 1853 and published in 1854. Its plot is singularly painful, and it abounds in monotonous descriptions. It evinces, however, a lofty imagination and a fine appreciation of nature.

**BALDER,** bąl'dĕr (Old Norse *baldr*, AS. *bealdor*, OHG. *balder*, prince, lord; cf. OHG. *bald*, bold, Old Norse *ballr*, bold, impudent). In Scandinavian mythology, the son of Odin and Frigg, symbol of summer, light, beauty, amiability, persuasive eloquence, and gracious wisdom. According to the *Gylfeginning* (see EDDA) he lived at Brejdablik. The *Voluspa* tells a story of his death suggesting the myths of Adonis and Persephone. Here Balder is killed by the evil god, Loki, aiming for the blind god, Hödur, an arrow of mistletoe (symbol of midwinter). He was the first of the *Æsir* to die. Hel, the goddess of the underworld, promised to release Balder, if heaven and earth unanimously asked it. Loki, as Thökt, refused, and escaped vengeance. But Balder will return after Ragnarök, the Twilight of the Gods, and usher in a golden age. Use has been made of this myth by Richard Wagner in his Nibelungen tetralogy. See AESIR; SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

**BALDER DEAD.** 1. A dramatic poem by the Danish writer, Johannes Ewald, published in 1773. 2. A stately and pathetic narrative poem by Matthew Arnold, founded on the death and funeral of the Norse god and his journey to the underworld, where he was held in honor. See BALDER.

**BALDERSTONE,** bąl'dĕr-stōn', CALEB. A faithful old butler in the family of the Master of Ravenswood, in Scott's *Bride of Lammermoor*.

**BALDI,** bäl'dē, BERNARDINO (1553–1617). An Italian savant and poet. He is said to have been master of a dozen languages and to have written upward of 100 different works. He became tutor to Ferdinando Gonzaga, through whom he was made Abbot of Guastalla, an office which he held for 25 years. He was famous as a theologian, mathematician, geographer, antiquarian, historian, and didactic poet. He devoted 12 years to the work of which the *Cronica dei matematici* is an abridgment and also wrote *La Nautica* (a finely toned poem on navigation), an Arabic grammar and dictionary, and a translation of the *Targum* of Onkelos. Consult G. Zaccagnini, *La vita e le opere di B. Baldi* (Modena, 1903).

**BALD'NESS,** ALOPECIA; CALVITES. Absence or deficiency of hair upon the scalp. Alopecia is the scientific term. Pincus is authority for the statement that the life of a hair is from two to six years, at the end of which time it falls and is replaced by new growth. According to this calculation, from 50 to 60 hairs are shed each day. During vigorous health and until the prime of life has been passed, enough new hairs grow to replace the dead ones, and baldness does not occur. Congenital baldness occurs in some individuals and is sometimes called *hypotrichosis congenita*. Senile alopecia is observed in the aged as a part of the general atrophy incident to this condition; there is a gradual thinning of the hair upon the top, front, and sides of the head, steadily advancing as age increases. Premature alopecia occurs in individuals from 20 to 35, either with or without manifestations of disease. A frequent cause of baldness in the young is seborrhœic eczema of the scalp, which is characterized by increased formation of dandruff and is of bacterial origin. It occurs as early as the eighteenth year. Other local causes are ringworm of the scalp, psoriasis, eczema, erysipelas, and lupus. Syphilis and favus (q.v.) are common causes. Anæmia, wasting diseases, such as fevers, childbearing, and debility due to dissipation, are all ascribed as causes of baldness. It is also hereditary in certain families and in such cases appears to be due to failure in the nutrition of the scalp. Women are less liable to baldness than men—a fact probably due to the circumstance that they take better care of the hair, and less frequently exhaust the natural oil of the sebaceous glands of the scalp by the use of strong alkaline shampoos. Shaving the head, when the hair falls in great quantity, as after long-continued fevers, is generally practiced; but the wearing of a wig impedes the growth of hair upon a shaven scalp. Chloral, ointment of mercury, cantharides, sulphur, tar, and resorcin are used with success in checking baldness in some cases.

ALOPECIA AREATA is a disease of the hair follicles of neurotic origin, which produces, quite suddenly, circumscribed patches of baldness of the scalp, sometimes of the eyebrows or beard, and in rare instances of the whole body. The disease often follows mental shocks, psychic disturbances, or injuries to the nerves. Consult Jackson and McMurty, *A Treatise on Diseases of the Hair* (Philadelphia, 1912); and Joseph, *Lehrbuch der haarkrankheiten* (Leipzig, 1910).

**BALDO,** bäl'dō, MONTE (It. bold mountain). A mountain group, 26 miles long and 7½ miles wide, on the boundary between south Tirol and the province of Verona, Italy, and bordering Lake Garda on the east. Its highest peaks are Cima di Val Dritta or Monte Maggiore (7277 feet) and Altissimo (6821 feet). Fine views are obtained from these summits, and the quarries yield choice marble.

**BALDOVINETTI,** bäl'dō-vē-nĕt'tē, ALESSIO (1425–99). A Florentine painter and decorative designer of the early Renaissance. His master in painting is unknown, but we do know from documents that he was associated with Andrea del Castagna and with Domenico Veneziano, of whom, according to Berenson, he was a pupil. He belonged to that group of realists whose chief mission lay in solving the technical problems of painting. According to Vasari, Baldovinetti used oils before their introduction into Italy by Antonello do Messina; he made especial progress in rendering landscape. Nearly all his paintings are in Florence. The earliest ascribed to him are three small panels belonging to the cycle painted by Fra Angelico (q.v.) for the sacristy doors of Sant' Annunciata and now in the Uffizi. His earliest attested painting is a fresco of the "Nativity" in the same church. Of his decorations for the Portuguese chapel in San Miniato (1466) only an "Annunciation" and several figures of the ceiling survive. His greatest and most ambitious achievement was a series of frescoes for Santa Trinità (completed in 1497), upon which he labored 16 years, receiving a compensation of 1000 gold florins. Of the many portraits they

contained, but a single head, a likeness of the painter himself, survives in the Galleria Morelli Bergamo; there also he is represented by a group of prophets on the ceiling. In the lunettes of the chapel at Bergamo are several subjects by him, but his fine altar-piece, "The Trinity," surrounded by saints and angels (1472), is now in the Academy of Florence. Among other noteworthy works are a charming "Annunciation" and a "Madonna with Saints" in the Uffizi; and Madonnas in the Louvre and the collection of Madame André, Paris.

Baldovinetti was perhaps more important as a decorative artist than as a painter. He designed some of the intarsias, executed by Giuliano da Majano, in the sacristy of the cathedral of Florence and painted many objects of applied art, such as the fronts of cassoni (chests), caskets, shields, coats of arms, etc. Of his stained glasses a good window survives in the Pazzi Chapel. Contemporaries considered him the foremost designer of mosaics in his day, and he wrote a practical manual upon the subject. He restored the mosaics of the façade and of the choir chapel of San Miniato, and both the interior and exterior of the baptistery. Consult: Pierotti, *Ricordi di Alessio Baldovinetti* (Lucca, 1868); Londi, *Alessio Baldovinetti* (Florence, 1907); Berenson, *The Study and Criticism of Italian Art* (2d series, London, 1902).

**BALD'PATE'**, or BALDHEAD. 1. An American white-headed duck. (See WIDGEON.) 2. A kind of domestic pigeon. 3. In the West Indies, a dove (*Columba leucocephala*). 4. A fruit crow (q.v.).

**BALDRIC**, bal'drik, or BAUDRICK (Fr. *baudrier*, from MGH. *balderich*, girdle). A band or sash worn partly as a military and partly as a heraldic symbol. It passes round the waist as a girdle, or passes over the left shoulder and is brought down obliquely under the right arm, or is suspended from the right shoulder in such a way as to sustain a sword. Many of the effigies of knights contain representations of the baldric, worn more frequently as a belt than as a shoulder sash.

**BALDUNG**, bäl'dung, HANS, usually called GRIEN (GRÜN), from his favorite color (c.1480–1545). A German painter and engraver, one of the principal artists of the High Renaissance. He was born at Weiersheim, near Strassburg, of a patrician family originally from Gmund in Swabia, the son of a jurist in the service of the Bishop of Strassburg. He probably studied in Nuremberg with Albrecht Dürer, whose influence is very perceptible in his early works, both paintings and engravings. In 1509 he became a citizen of Strassburg; in c.1512–16 he was employed upon the great altar and other decorative works in the minster at Freiburg, and from 1517 until his death he resided at Strassburg as court painter to the bishop and as a member of the city council. A good example of the painting of his earliest period is the "Adoration of the Kings" in the Berlin Museum. His masterpiece is the great altar of Freiburg Minster, the central panel of which represents the Coronation of the Virgin; the wings, four scenes from her life. The masterly treatment of light and shade in this painting shows his indebtedness to Grünewald (q.v.). To the same period belong two "Crucifixions" at Berlin and Basel and two other paintings in the cathedral of Freiburg. The most notable of his remaining pictures are the "Bewailing of the Body of Christ" in the National Gallery, London; two representations of "Death Seizing a Young Woman" (1517) in the Museum of Basel, and the "Birth of Christ" (1520) in the Museum of Aschafenburg. Other examples of his work are in the collections of Sigmaringen and Strassburg. His style was not especially adapted to portraiture, but of all his work of this kind the masterpiece is the votive picture in which the Margrave Cristoph of Baden, his wife, 10 sons, and 5 daughters are represented as kneeling before the Madonna and St. Elizabeth. Baldung's chief strength lay in his draughtsmanship; no other painter of the German Renaissance, except Dürer and Holbein, has left as many drawings as he. He excelled especially in his designs for woodcuts, which allowed a freer scope to the imagination than painting (for a list of his woodcuts, see the article "Baldung" in Meyer's *Kunstler Lexicon*). No less famous as a designer of stained glasses, he produced pieces which may now be seen in the Freiburg Minster and the museums of Berlin, Nuremberg, Karlruhe, Basel, and Freiberg. As a painter he was one of the very best of his day, in color excelling Dürer and most of his other contemporaries. Consult the monograph by Von Téreys (Strassburg, 1896), and Baumgarten, *Der Freiburger Hochaltar*, vol. xlix (Strassburg).

**BALDWIN**, BALDOUIN, or BALDUIN. The name of several members of the house of Flanders, who reigned as Kings of Jerusalem during the period of the Crusades.—BALDWIN I (1058–1118) was King of Jerusalem after 1100. He was the youngest brother of Godfrey de Bouillon (q.v.), Duke of Lower Lorraine, or Brabant. He took part in the First Crusade, quarreled with Tancred, retired to Edessa at the request of the Christian inhabitants of the place, and was soon after created Count of Edessa. After the death of his brother Godfrey, in 1100, he became Protector of the Holy Sepulchre and Baron of Jerusalem, and immediately assumed the regal title, which his brother had refused. He was defeated by an invading force from Egypt in 1102. He made some conquests, including Cæsarea, Acre, and Sidon. He died in Egypt. Unlike his brother, Godfrey, Baldwin was worldly and ambitious.—BALDWIN II (Baldwin du Bourg), cousin of Baldwin I, succeeded the latter as Count of Edessa, and in 1118 as King of Jerusalem, reigning until 1131. During his reign Tyre was taken, in 1124, with the assistance of a Venetian fleet, and the Order of the Templars was instituted. He was held in captivity by the Turks for six months. He died Aug. 21, 1131, leaving four daughters. Shortly before his death he resigned the crown in favor of his son-in-law, Fulk of Anjou, who reigned till 1142.—BALDWIN III (1129–62), the son and successor of Fulk of Anjou, was King of Jerusalem after 1143. He has come down to us in tradition as a model of crusading chivalry. The Christians lost Edessa during his reign. He several times defeated Nureddin, Sultan of Aleppo. He endeavored to improve the external and internal defenses of his kingdom. Saracens are said to have served under him, so much was he respected. He married Theodora, the daughter of the Greek Emperor Manuel, and died, it is believed, of poison, at Tripolis, in Syria, Feb. 10, 1162. His reign marked the height of power of the Latin Kingdom of Jerusalem. He was succeeded in the government by his brother Amalric, or Amaury, who died in 1173.—BALD-

WIN IV, the son and successor of Amalric, surnamed the Leper, reigned till 1183.—BALDWIN V, a child of five, the son of Sibylla, sister of Baldwin IV, was then called to the throne. He died in 1186, a year before Jerusalem was retaken by Saladin. Consult Gibbon, *Decline and Fall of the Roman Empire*, and Cox, *History of the Crusades* (New York, 1889); also references under CRUSADES.

**BALDWIN I** (1171–c.1206). The first Latin Emperor of Constantinople. He was born at Valenciennes, the son of Baldwin VIII, Count of Flanders and Hainaut. In 1195 he succeeded his father as Count of Flanders. In 1200 he appointed his brother Philip to the regency of Hainaut and Flanders and joined the Fourth Crusade. Part of the Crusaders—Baldwin I among others—were induced to assist the Venetians in reconquering Zara, in Dalmatia, from the King of Hungary. While at Zara the young Alexius, son of Isaac II, Emperor of Constantinople, asked the assistance of the Crusaders against his uncle, Alexius Angelus, who had deposed and blinded Isaac II and had usurped the throne. In return for their aid he promised to pay the Crusaders a liberal sum of money, to help them recover Palestine, and to effect the union of the Greek church with the Roman. The Crusaders agreed, defeated the usurper's forces, and restored the rightful emperor; but when Alexius was unable or unwilling to carry out his promises, they turned their arms against him. A revolution broke out in the city at the same time. Alexius the Younger was murdered, and his father died soon after. Alexius Ducas Murzuflos then usurped the throne, but was defeated by the Crusaders, and Constantinople was sacked, the Latins and the Venetians sharing the booty. Baldwin was chosen Emperor, and crowned on May 9, 1204; but he received only about a fourth part of the Empire—Constantinople and Thrace—the Venetians obtaining "a quarter and a half of a quarter of the Empire." A part also fell to the French adventurers who accompanied the expedition, and several provinces remained in the hands of Greek princes. The capacities of Baldwin I were not able to cope with the evils necessarily attending so anomalous a position. The Greeks were discontented and, backed by Calo-John, King of Bulgaria, took advantage of the absence of Baldwin I's brother with the flower of his troops in Asia and rose and massacred the Latins scattered throughout the towns of Thrace and made themselves masters of Adrianople. Baldwin laid siege to the town with the forces he had at his disposal, but was defeated and taken prisoner, April 14, 1205, by the Bulgarian King, and probably died about a year after (1206) in captivity. The facts about his death were never known. In 1225 a usurper attempted to pass himself off for Baldwin and thus obtain Flanders. Baldwin I was succeeded by his brother Henry. Consult Pears, *Fall of Constantinople* (London, 1885), and Gerland, *Geschichte des lateinischen Kaiserreiches*, Teil i (Hamburg, 1905).

**BALDWIN II** (1217–73). The last Latin Emperor of Constantinople, from 1239 to 1261. He was the son of Peter II (de Courtenay) and the nephew of Baldwin I. When his brother Robert died, in 1228, Baldwin was too young to rule, and an agreement was made with John of Brienne, who had been King of Jerusalem, by which Baldwin was to marry John's second daughter, and John was to be Emperor until his death. John died, March 23, 1237, but as Baldwin was in western Europe he was not crowned Emperor until December, 1239. His reign was disastrous. He spent much of the time in the West, seeking aid in the defense of his capital. In order to obtain money he sold to St. Louis of France some of the most sacred relics at Constantinople, to hold which Louis built the Sainte Chapelle at Paris. On the night of July 25 or 26, 1261, his capital was taken by one of the generals of Michael Palæologus, ruler of Nicæa, and Baldwin fled to Italy. With him terminated the Latin Empire in the East. Consult Gibbon, *Decline and Fall of the Roman Empire*, vol. vi (new ed., London, 1898).

**BALDWIN, ABRAHAM** (1754–1807). An American statesman. He was born at Guilford, Conn., and graduated at Yale in 1772. In 1777 he entered the army as chaplain, and served until the close of the Revolutionary War, when he removed to Savannah, Ga. In 1784 he was sent to the State Legislature, and from 1786 to 1788 was a delegate to the Continental Congress. He was a prominent member of the Constitutional Convention of 1787, and as such cast an important vote, leading to a compromise, the result of which was the creation of the United States Senate. He was a member of Congress from 1789 to 1799, and was United States Senator from 1799 until his death, serving in 1801 and 1802 as President pro tem. In 1802 he was one of the three Georgia commissioners who negotiated the cession to the Federal government of a large part of the State's western lands. He conceived the plan of the University of Georgia, obtained a charter for it, and from 1786 to 1801 served as its first president.

**BALDWIN, CHARLES H.** (1822–88). An American naval officer, born in New York City. He entered the navy in 1839, served as midshipman during the Mexican War, and became a lieutenant in 1853. He resigned in the following year, but reëntered the service in 1861 and in 1862 commanded the *Clifton*, of the mortar flotilla under Farragut, at Forts Jackson and St. Philip. In 1869 he was appointed captain, and in 1883 was promoted to be rear admiral, commanding the Mediterranean Squadron. He was retired in 1884.

**BALDWIN, CHARLES SEARS** (1867– ). An American college professor and author, born in New York City, and educated at Columbia University, where he received the degrees of A.B., A.M., and Ph.D. In 1891 he was appointed instructor in English in that university and, in 1895, instructor in rhetoric. He then became a member of the faculty of Yale University, but returned to Columbia in 1911 as professor of rhetoric and English composition. His writings include: *The Inflections and Syntax of the "Morte d'Arthur" of Sir Thomas Malory* (1894); *Specimens of Prose Description* (1895); *De Quincey's Revolt of the Tartars* (1896); *The Expository Paragraph and Sentence* (1897); *A College Manual of Rhetoric* (1902); *American Short Stories* (1904; Ger. ed., 1911); *How to Write: A Handbook Based on the English Bible* (1905); *Bunyan's Pilgrim's Progress* (1906); *De Quincey's Joan of Arc and English Mail Coach* (1906); *Essays out of Hours* (1907); *Writing and Speaking* (1909); *Composition, Oral and Written* (1909).

**BALDWIN, EVELYN BRIGGS** (1862– ). An American Arctic explorer, born at Springfield, Mo. He studied at Northwestern College (Naper-

ville, Ill.), and taught in the public schools of Kansas in 1887–91. In 1892 he was appointed observer in the United States Weather Bureau. Subsequently he became an inspector-at-large in the United States Signal Corps. In 1893–94 he was meteorologist of the Peary Expedition to North Greenland, and in a similar capacity accompanied in 1898–99 the Walter Wellman Expedition to Franz-Josef Land. He discovered and explored Graham Bell Land in May, 1899. In 1901 he organized the Baldwin-Ziegler Expedition, sailing under his command for the discovery of the North Pole by way of Franz-Josef Land. The expedition returned in 1902, having deposited several caches of provisions in Franz-Josef Land. Baldwin wrote for periodicals several articles dealing with Arctic life.

**BALDWIN,** JAMES (1841– ). An American author and compiler, born in Hamilton Co., Ind. In 1887–90 he was connected with the educational department of Harper and Bros., New York, and from 1890 to 1893 was assistant editor of *Harper's Magazine*. He then became a schoolbook editor for the American Book Company. His publications include: *Six Centuries of English Poetry* (1892); *The Famous Allegories* (1893); *Old Greek Stories* (1895); *The Horse Fair* (1895); *Four Great Americans* (1896); *Hero Tales Told in School* (1904); *Abraham Lincoln, a True Life* (1904); *Thirty More Famous Stories* (1905); *The Golden Fleece* (1906); *Stories of the King* (1909); *Fifty Famous People, a Book of Short Stories* (1912).

**BALDWIN,** JAMES MARK (1861– ). An American psychologist, born at Columbia, S. C. He graduated from Princeton in 1884 and received A.M. and Ph.D. degrees from that university in 1887 and 1889, respectively. He studied at Leipzig, Berlin, and Tübingen in 1884–85. In 1886–87 he was instructor in German and French at Princeton; from 1887 to 1889 he held the chair of philosophy at Lake Forest University (Ill.); and thereafter, up to 1909, he was successively professor of logic and metaphysics at the University of Toronto (Canada), Stuart professor of psychology at Princeton, and professor of philosophy and psychology at Johns Hopkins University. In 1909 he became honorary professor at the National University of Mexico. He was given the first honorary D.Sc. conferred by the University of Oxford and also received LL.D. degrees from the universities of Glasgow and of South Carolina. Perhaps best known in the fields of child and social psychology and of genetic logic, he also gained recognition in experimental psychology as an advocate of the fundamental importance of "motor" elements in consciousness, as the founder at Toronto of the first psychological laboratory to be established in the British Empire, and as the founder also of the psychological laboratory at Princeton. With J. McK. Cattell in 1894 he founded the *Psychological Review*. Besides various articles in philosophical, psychological, and popular journals, he is the author of the following works: *German Psychology of To-Day* (trans., 1886); *A Handbook of Psychology* (2 vols.: i, 1889; ii, 1891; i, 2d ed., 1890); *Elements of Psychology* (1893); *Mental Development in the Child and Race* (1895, 3d ed., 1906); *Social and Ethical Interpretations in Mental Development* (1897; 4th ed., 1906); *The Story of the Mind* (1898); *Fragments in Philosophy and Science* (1902); *Development and Evolution* (1902); *Thought and Things, or Genetic Logic* (3 vols., 1906–11); *Darwin and the Humanities* (1909); *The Individual and Society* (1910); *History of Psychology* (1912). Editor: *Dictionary of Philosophy and Psychology* (3 vols., 1901–05); *The Psychological Review* (1894–1909); "Philosophy," in *Johnson's Universal Encyclopedia; Library of Historical Psychology* (1903– ); *Princeton Contributions to Psychology* (1897–1903).

**BALDWIN,** JOHN DENISON (1809–83). An American journalist, born at North Stonington, Conn. He was self-educated, studied law and theology, and for several years after 1833 was pastor of a church at North Bradford, Conn. He was editor successively of the *Charter Oak*, a Hartford newspaper, the *Boston Commonwealth*, and the *Worcester Spy;* was three times chosen member of Congress, and wrote extensively for the magazines on archæological and kindred subjects. He published *Raymond Hill*, a volume of poems (1847), *Prehistoric Nations* (1869), and *Ancient America* (1874).

**BALDWIN,** JOSEPH G. (1815–64). An American humorist. He was born in Alabama, where he was successful in law, politics, and literature. In 1854 he went to California and was a justice of the Supreme Court of that State (1858–62) and chief justice (1863–64). His best-known early publications are his racy *Flush Times in Alabama and Mississippi* (1853) and *Party Leaders* (1855). The latter contains judicial estimates of Southern statesmen. He died in San Francisco. Consult Mallers, in *The Sewanee Review* (April, 1901).

**BALDWIN,** ROBERT (1804–58). A Canadian statesman. He was born at York (now Toronto), received a grammar-school education, and was called to the bar in 1825. He soon became interested in politics. At that time the administration of affairs in Upper and Lower Canada (now respectively the provinces of Ontario and Quebec) was controlled by an oligarchy which monopolized the public offices. In both provinces there was much popular discontent and a demand for an executive council accountable to the legislature. (See POLITICAL PARTIES, *Canada;* also CANADA, *History.*) This demand affirmed the principle of responsible government, which early engaged the support of Baldwin and dominated the remainder of his public life. In 1829 he was elected to the Assembly of Upper Canada, but in 1830 lost his seat on a technicality and for six years thereafter untiringly labored in behalf of the popular cause. In 1836 he was made a member of the executive council by the reactionary Lieutenant Governor, Sir Francis Bond Head, but, hampered by political opponents in the council, found that he could not be useful and resigned. The radical reformers, led by William Lyon MacKenzie, broke out in rebellion in 1837–38, but Baldwin condemned their course, maintaining that a responsible executive was amply sufficient to restore public confidence. The Radicals of Lower Canada had also revolted (1837–38); and until the arrival of the Earl of Durham as Governor General and High Commissioner in 1838 there were few signs of English interference to allay the increasing discontent. The famous report of that nobleman in 1839 influenced the British Parliament to favor responsible government and brought about the passage in 1841 of an act which united the two provinces. Baldwin became a member of the executive council under the new régime; but, dissatisfied with the attitude of the Governor General, Lord Sydenham, he soon resigned. In the meantime friendly

coöperation between the leaders in Upper and Lower Canada, which had been promoted by the union, led to a successful popular party under dual leadership. In harmony with this movement Baldwin and Louis Hippolyte LaFontaine became in 1842 the leading members of the first Canadian administration to accept responsible government. That principle was, however, not yet firmly established; and Sir Charles (afterward Baron) Metcalfe, who opposed it, adopted a course which compelled Baldwin to resign in 1843. Five years of heated controversy followed, and in 1848 Baldwin and LaFontaine were again returned to power. Their administration (1848–51) marked the final and complete establishment of responsible government. Among the important reforms passed under Baldwin's leadership were the revision of the judicial system of Upper Canada, the foundation of Toronto University on a nonsectarian basis, and the organization of municipal government in that province. Under this administration also the railway system of Canada began to be vigorously developed. The disaffected in Lower Canada were appeased by amnesty and by a bill reimbursing those who had suffered from destruction of property in the rebellion of 1837–38. Baldwin resigned in 1851, mainly from lack of sympathy with the advanced wing of his party, of whose radical tendencies he strongly disapproved. His purity of personal character and his political integrity were never questioned. Consult Dent, *Canadian Portrait Gallery* (Toronto, 1880); Leacock, "Baldwin, Lafontaine, Hincks" (Toronto, 1907), in *The Makers of Canada Series*.

**BALDWIN,** SIMEON EBEN (1840–1927). An American jurist and educator, born at New Haven, Conn. He graduated in 1861 at Yale, was admitted to the bar in 1863, and in 1869 was appointed an instructor in the Yale Law School. He became professor of constitutional and private international law in 1872 and in 1893 associate judge of the State Supreme Court of Errors. From 1907 to 1910 he was chief justice of that court, then becoming Governor of Connecticut. At various times he was president of the American Bar Association, the American Social Science Association, the International Law Association, the American Historical Association, and the American Political Science Association. He was a member of the commission appointed in 1872 by the State to revise laws on education and of that appointed in 1873 to revise the General Statutes. His publications include: *Digest of the Decisions in the Connecticut Law Reports* (2 vols., 1872, 1882); *Modern Political Institutions* (1898); *American Railroad Law* (1904); *The American Judiciary* (1905); *The Relation of Education to Citizenship* (1912).

**BALDWIN,** WILLIAM HENRY, JR. (1863–1905). An American railway official, born in Boston, Mass. He graduated at Harvard College in 1885, and four years later was made president of the Montana Union Railroad. He soon became associated with the development of the Union Pacific Railway, of which system he became assistant vice president in 1890–91. He was general manager of the Flint and Pere Marquette Railroad (1891), third vice president (1894–95) and second vice president (1895–96) of the Southern Railway. In 1896 he became president of the Long Island Railroad, which position he held at the time of his death. In 1903 he was also made president of the Pennsylvania and Long Island Railroad Company, organized to extend tunnels under the North River, Manhattan Island, and the East River, to connect with the Long Island Company's system. Mr. Baldwin took an active and effective interest in various reform movements in New York and also in educational work in the South. He was at one time chairman of the General Board of Education. Consult J. G. Brooks, *An American Citizen* (Boston and New York, 1910), and *Memorial* by People's Institute (New York, 1905).

**BALDWIN CITY.** A town in Douglas Co., Kan., 15 miles south of Lawrence, on the Atchison, Topeka, and Santa Fe Railroad (Map: Kansas, G 5). It is the seat of Baker University (M. E.), founded in 1858. Near the town is the battlefield of Black Jack, the scene of the first bloodshed in the slavery strife preliminary to the Civil War. Baldwin City was settled in 1853 and was incorporated about 1858. It has a mayor, elected annually, and a city council. The water works and electric light plant are owned by the municipality. Pop., 1900, 1017; 1910, 1386; 1913 (est. exclusive of 800 students), 1450.

**BALDWINSVILLE.** A village in Onondaga Co., N. Y., 12 miles northwest of Syracuse, on the Delaware, Lackawanna, and Western Railroad, and on the Barge Canal and Seneca River and Syracuse Lakeshore and Northern Electric Road. Supplied with natural gas and excellent electric power plant for both power and lighting (Map: New York, D 4). The industries of the village include machine, spring, and knife works, and paper mills. Baldwinsville is in a highly productive agricultural region, producing grain, corn, hay, tobacco, and dairy products. The village has a splendid high school and owns its water works. Pop., 1890, 3040; 1900, 2992; 1910, 3099.

**BÂLE,** bâl. See BASEL.

**BALE,** JOHN (1495–1563). Bishop of Ossory, in Ireland, born in the village of Cove, Suffolk, England, Nov. 21, 1495. He was educated as a Carmelite monk at Cambridge, but afterward turned Protestant, became rector at Thornden, in Suffolk, and, being persecuted by the Roman Catholics, fled to Flanders (1540), where he remained eight years, during which he wrote numerous works. He was recalled by Edward VI and successively presented to the living of Bishopstoke, in Hampshire, and the bishopric of Ossory (1552). In this latter sphere he made himself so obnoxious to the Roman Catholics by his zeal in the Protestant cause that on news of the death of Edward (1553) his house was attacked and five of his servants killed. He himself escaped out of the country, after great difficulty and heavy loss, and came finally to Basel. On the accession of Elizabeth (1559) he returned to England and was made a prebendary in the cathedral of Canterbury, where he died in November, 1563. His chief work was first published in 1548 under the title of *Illustrium Majoris Britanniæ Scriptorum Catalogus hoc est Angliæ, Cambriæ et Scotiæ Summarium*, a history of English literature. His *Select Works* were published by the Parker Society, with a biography (Cambridge, 1849). He wrote many treatises and several scriptural plays.

**BALEARIC** (băl'ē-ăr'ĭk) **CRANE.** See CRANE.

**BALEARIC ISLANDS.** A group of four large islands—Mallorca (Majorca), Menorca (Minorca), Ibiza (Iviza), and Formentera—and 11 islets (Cabrera the largest), which constitute a province of Spain. They lie off the coast of

Valencia, in the Mediterranean, in lat. 38° 4′ to 40° 5′ N., and long. 1° to 5° E. (Map: Spain, G 3). They have a total area of 1936 square miles and a population (Dec. 31, 1910) of 326,023. The climate is healthful and temperate. The soil generally is good. Vines, olives, and other fruit trees are cultivated abundantly. The coasts are precipitous, with some excellent harbors—that of Mahón, in Minorca, being one of the finest in Europe. The Balearic Islands were taken possession of by the Carthaginians at an early date, and after the destruction of Carthage they fell into the hands of the Romans. They were taken by the Saracens in 798 and became a separate Moorish kingdom in 1009. In 1232 the Moors were expelled from the islands by King James I of Aragon, and from 1276 the islands formed the independent kingdom of Mallorca until they were annexed to Aragon in 1349. The capital is Palma, on Mallorca. Consult Vuillier, *The Forgotten Isles* (New York, 1896), and Harrasowsky, "Les Baléares," in the *Revue de Géographie*, vol. xliv (Paris, 1899).

**BALEEN'** (Fr. *baleine*, Lat. *balena*, whale). Whalebone in its original state in the mouth of a baleen whale. See WHALE.

**BALEN,** bä'lĕn, HENDRIK VAN (1575–1632). A Flemish painter. He was born at Antwerp and was the pupil of Adam van Noort, the teacher of Rubens. He finished his studies in Italy and became instructor of Van Dyck and Snyders. Later he was influenced by Rubens and even by Van Dyck, as may be seen in the excellent paintings, including portraits of the painter and his wife, over their tomb in St. Jacob's, Antwerp. He excelled in small figures, especially mythological subjects. Good examples of his work are in the cathedral and museum of Antwerp and other important galleries of Belgium, and in Holland, Germany, and the Louvre.

**BALER,** bä-lär'. The capital of the sub-province of Principe, in the island of Luzon, Philippines, on the Baler River, about 90 miles from Manila, with which it carries on trade by land and water. United States troops took possession of this town in April, 1900. Pop., about 2500.

**BALESTIER,** băl'ĕs-tēr'. WOLCOTT (1861–91). An American journalist, publisher, and author, born at Rochester, N. Y. He studied at Cornell University and the University of Virginia, and in New York City was editor of *Tid-Bits*, a humorous weekly, whose name was afterward changed to *Time*. In 1889 he became junior member of the publishing house of Heinemann & Balestier, of London and Leipzig. His publications include: *A Patent Philtre* (1884); *A Fair Device* (1884); a campaign life of James G. Blaine (1884): *A Victorious Defeat* (1886); *A Common Story* (1891); with Rudyard Kipling (his brother-in-law), *The Naulahka*, of which Balestier wrote the early (American) chapters (1892, 1900); and "Benefits Forgot," in the *Century Magazine* (1892).

**BALFE,** bălf, MICHAEL WILLIAM (1808–70). A popular English composer of operas. He was born, May 15, 1808, in Dublin. When only seven years old, he played in public one of Viotti's concertos for the violin. At 16 he made his début in London as a violinist, in the Drury Lane orchestra. In 1825 he went to Italy, where he studied counterpoint under Federici at Rome, and singing under Filippo Galli at Milan, and began his successful career as a composer, with music for the ballet *La Pérouse*, performed at La Scala, in Milan. In 1827 he sang in the Italian Opera at Paris with Malibran and Sontag. He, however, returned to Italy and devoted himself to composition, producing in rapid succession some 30 operas, of which the most popular are *The Bohemian Girl* (1843), *The Rose of Castile* (1857), *Satanella* (1858), and the posthumous *Il Talismano* (1874), his most serious effort. Balfe lacks depth and individuality; but his gift of simple melody, his strong comic vein, and his facility of writing have won for him a prominent place among English composers. Consult C. L. Kenney, *Memoir* (London, 1875), and W. A. Barrett, *Balfe: His Life and Work* (London, 1882).

**BALFOUR,** băl'fo͝or or băl'fēr, ARTHUR JAMES (1848– ). An English statesman. He was born July 25, 1848, and studied at Eton and Cambridge. From 1878 to 1880 he acted as private secretary to his uncle, the Marquis of Salisbury, Secretary of State for Foreign Affairs. He represented Hertford in the House of Commons in 1874–85 and Manchester from 1886 to 1905, acting, during his early parliamentary career, with the famous "Fourth Party" led by Lord Randolph Churchill. He was President of the Local Government Board in 1885, became Secretary of State for Scotland in 1886, and Chief Secretary for Ireland in 1887. This last appointment was severely criticised, since Balfour's reputation had been that of an easy-going philosopher; but in office Balfour seemed a different man. He administered his office with a combination of strictness and good sense such as had been shown by few of his predecessors. As a result, in 1891 he was made First Lord of the Treasury and government leader in the House of Commons, offices which he resumed in 1895 after acting as leader of the Opposition during the intervening period of Liberal ascendency (1892–95). On the retirement of Lord Salisbury in July, 1902, he succeeded to the premiership. His tenure of office was chiefly remarkable as witnessing the decline and partial disintegration of the powerful Unionist party. The chief cause contributing to its downfall was the attitude of the government on the question of tariff reform, which was brought to the forefront by Joseph Chamberlain (q.v.) in 1903. Without embracing Mr. Chamberlain's protectionist views, the premier made himself the advocate of a professedly half-way policy which the supporters of free trade characterized as identical with Mr. Chamberlain's proposals. In 1903 the Cabinet was reconstructed as a result of the resignation of several members who were opposed to protection. In the Commons a number of Unionists seceded to the Liberal party, while another section was active in combating protectionist principles within the party. The sessions of 1904 and 1905 were given over largely to debates on the fiscal question, in which the opposition sought to elicit from the premier a definite statement as to the relation of his views to those of Mr. Chamberlain, and failed before his remarkable adroitness. On July 20, 1905, the government was defeated in the House of Commons in the course of an Irish debate, but the premier declined to resign on the ground that the vote was in the nature of a trick. Dissensions within the party, however, finally led to the resignation of the ministry in December. In the general election of January, 1906, the Unionists suffered a crushing defeat, Mr. Balfour himself failing of reëlection in Manchester,

He entered Parliament, however, as representative for the City of London and continued, as leader of the Conservative Opposition, to play a leading rôle in the proceedings of the House of Commons. In the struggle between the Lords and Commons that immediately preceded the enactment of the Parliament Act, Balfour counseled submission, at the same time making public to the Conservative leaders a letter from the Prime Minister which told of the King's promise to create new peers if necessary. For this Balfour was criticized and he resigned, Nov. 8, 1912. During the European war he was First Lord of the Admiralty, 1915–16, Foreign Secretary, 1916–19, and head of the mission to the United States in 1917. After the war he represented his country in the League of Nations, at the Washington Disarmament Conference, and other important councils. In Mr. Balfour's philosophic writings the naturally skeptical bent of his mind is clearly displayed; he is one to whom disbelief, or a contemptuous suspension of judgment, comes more easily than faith. As a writer, his highest merits are subtlety and originality, though Spencer and others whose conclusions he impugns have accused his dialectic of sophistry. His works are: *A Defense of Philosophic Doubt* (1879); *Essays and Addresses* (1893); *The Foundations of Belief* (1895; new ed., 1900); *The Fiscal Reform* (1906); *Arthur James Balfour as a Philosopher and Thinker* (1912); *Theism and Humanism* (1915); *Essays, Speculative and Political* (1920).

**BALFOUR,** Andrew (1873– ). A Scottish bacteriologist and author, born in Edinburgh. His earlier education was obtained in his native city—at George Watson's College and at the university. Later he took advanced studies at Cambridge, but it was from the University of Edinburgh that he received the degree of M.D. in 1898. In 1900–01 he served as civil surgeon in the South African War, and from 1902 to 1910 was director of the Wellcome Research Laboratories at Khartoum. He was also appointed sanitary adviser to the Sudan medical department, and medical officer of health for Khartoum. He wrote several novels: *By Stroke of Sword* (new ed., 1901); *To Arms!* (new ed., 1902); *Cashiered, and Other War Tales* (1902); *Vengeance is Mine* (new ed., 1905); and the following medical works: *Public Health and Preventive Medicine*, with C. J. Lewis (1902); the first, second, third (1909), and fourth (1912) *Reports of the Wellcome Research Laboratories; Review of the More Recent Advances in Tropical Medicine*, with R. G. Archibald (1909); *Second Review* (of the same) (1911).

**BALFOUR,** Francis Maitland (1851–82). A Scottish embryologist, born at Edinburgh; brother of the Rt. Hon. A. J. Balfour. He graduated in 1873 at Trinity College, Cambridge. In 1876 he was appointed lecturer on, and (1882) professor of, animal morphology. His publications are: *The Development of Elasmobranch Fishes* (1878), made up largely of the results of original research conducted at Cambridge and at the Stazione Zoölogica of Naples; and *A Text-book of Comparative Embryology* (2 vols., 1880–81), in great part an original work, distinguished alike for profound learning and clear statement. He was killed, with his guide, on July 19, 1882, during either the ascent or descent of the Aiguille Blanche de Penteret, Switzerland.

**BALFOUR,** Gerald William (1853– ). An English politician born at Edinburgh. He studied at Eton and received the degree of M.A. from Trinity College, Cambridge. In 1855–86 he served as member of the Commission on Labor, and was private secretary to his brother, the Rt. Hon. A. J. Balfour, then President of the Local Government Board. He became a member of Parliament in 1885: from 1895 to 1900 was Chief Secretary for Ireland and introduced the Local Government Bill; in 1900 was appointed President of the Board of Trade, and in 1905 President of the Local Government Board. He failed of reelection to Parliament in the general election of 1906.

**BALFOUR,** Isaac Bayley, M.D., LL.D. (1853–1922). A Scottish botanist, born in Edinburgh. He graduated at the University of Edinburgh, studied at Strassburg and Wurzburg, and from 1879 to 1884 was professor of botany in the University of Glasgow. In 1884–88 he was professor of botany at Oxford and in the latter year accepted a similar chair at the University of Edinburgh. He also became King's botanist in Scotland, and keeper of the Royal Botanic Garden at Edinburgh. In 1880 he explored the island of Socotra, Indian Ocean, on behalf of the British Association and of the Royal Society, Edinburgh, in whose *Transactions*, vol. xxxi (1888), appeared the results of the journey. He became, in 1887, an editor of the *Annals of Botany*. A *Botany of Rodriguez* he published in 1878, and a *Botany of Socotra* 10 years later.

**BALFOUR,** Sir James (?–1584). A Scottish judge and politician. He was educated for the priesthood, but devoted himself to ecclesiastical law. He was implicated in the plot for the assassination of Cardinal Beaton, and after the surrender of the castle of St. Andrews (June, 1547) was imprisoned in the French galleys. He regained his freedom by changing his creed and returned to Scotland. He conspired with Bothwell for the murder of Darnley and received the governorship of Edinburgh Castle, which he later surrendered to Murray, in return for a pardon for his share in Darnley's death and other favors. He was Lord President of the Court of Session during Murray's regency, but, suspected of intriguing with the adherents of the Queen, he was deprived of his office in 1568. After Murray's death Balfour contrived to gain the favor of the new regent, Morton, and received a commission to make a general digest of the law. This is the earliest text-book on Scottish law and is called *Balfour's Practicks*. In 1573 he again fell into disfavor and fled to France, but returned about 1580 and was instrumental in bringing about the fall of Morton. He died before Jan. 24, 1584. Balfour is one of the most contemptible figures of the period—"the most corrupt man of his age," as Robertson rightly describes him, though the scorn of Knox for "Blasphemous Balfour" may perhaps be partially explained by his abandonment of Protestantism in the galleys.

**BALFOUR,** John. A Covenanter who appears in Scott's *Old Mortality* as "Balfour of Burley." The real John Balfour, the Covenanter, was historically of Kinlock and not of Burley or Burleigh. John Balfour of Burleigh participated in the assassination of Archbishop Sharp in 1679 and was outlawed.

**BALFRUSH,** bal-frōōsh′, or **BARFRUSH** (Pers. landing place, market). An important

commercial town in the Persian province of Mazanderan, situated on the river Bahbul, about 12 miles from its mouth in the Caspian Sea (Map: Persia, E 3). It is a clean and well-built town with fine bazaars and the ruins of an old pleasure palace of Shah Abbas. It is connected by a well-shaded road with Meshed-i-Ser, its port, through which it carries on a considerable trade in cotton, dried fruit, sugar cane, flax, hemp, and metals, chiefly with Russia. The town is also connected by road with Teheran and carries on extensive commerce with the interior. The population was once estimated at 200,000, but it has since been greatly reduced by epidemics, so that at present it is less than 50,000.

**BALG**, bälg, GERHARD HUBERT (1852– ). An American philologist, born at Efferen, near Cologne, Germany, and educated partly in that country and partly at the University of Wisconsin, where he graduated in 1881. He received the degree of Ph D. at Heidelburg, in 1883, and taught at the University of Wisconsin and at private and public schools in the United States. He published several valuable philological works, notably *A Comparative Glossary of the Gothic Language, with Especial Reference to English and German* (1887–89); *The First Germanic Bible, and the Other Remains of the Gothic Language* (1891), and an English edition of Wilhelm Braune's *Gothic Grammar* (1883–95). He also supplied Germanic etymologies for the *Standard Dictionary*.

**BALGOWNIE, BRIG OF.** A bridge of a single arch, over the Don at Aberdeen, Scotland, built in 1320.

**BALI**, bä'lē. One of the Dutch East India islands, situated east of Java, from which it is separated by the narrow Bali Strait (Map: East Indies, E 6). It forms, with the island of Lombok, the Dutch outpost residency of Bali and Lombok, having an area of 4063 square miles and a population of 524,000. The island covers an area of over 2168 square miles. Its surface in general closely resembles that of Java. It is mountainous and volcanic and reaches in its highest summit (the volcano Gunung-Agung) an altitude of 10,497 feet. In the lower portions of the island the common products of the East Indies, such as rice, cotton, sugar, coffee, tobacco, and indigo, are raised in large quantities. Politically the island is divided into the two districts of Buleleng and Jembrana (Dutch) and the autonomous states of Klung Lung, Bangli, Mengui, Badung, and Tabanan. The capital is Buleleng.

The natives, anthropologically, are one of the most interesting peoples of Malaysia. Physically and linguistically they are close to the Malayan or proto-Malayan Javanese and share the capacities of these for culture. In metal work and sculpture they are markedly successful. The Balinese and the natives of the adjacent island of Lombok, alone in Malaysia, retain as their religion Brahmanism in a form older than that now found in Hindustan, and other traces of Hindu influence also occur. The participation of the women in trade and industry indicates a power to resist the doctrines of Islam. Of more recent literature since Laut's *Het eiland Bali en de Balienzen* (Amsterdam. 1848) may be mentioned Van Vlijmen's *Bali* (Amsterdam, 1875). See INDONESIANS; MALAYS.

**BALIKESRI**, bä-lē'kĕs-rī, or **BALIKISRI**. A town of Asiatic Turkey, in the vilayet of Brusa, about 75 miles southwest of the city of Brusa (Map: Turkey in Asia, B 3). It contains a number of mosques and is the seat of an annual fair, visited by over 30,000 people. There is commerce in grain, opium, silk, and the region abounds in minerals. Its population is nearly 25,000, of which about three-fourths are Mohammedans.

**BALINESE**, bä'lē-nēz'. See BALI.

**BALINGHEM**, bä'lăN'gaN'. The historic site of the "Field of the Cloth of Gold," a small town near Calais, in the department of Pas-de-Calais, France. See FIELD OF THE CLOTH OF GOLD.

**BALIOL**, bā'lī-ol *or* bäl'yol, EDWARD DE (?–1367). The son of John Baliol. He was received as the vassal King of Scotland at the English court and made himself conspicuous, in 1332, by his daring and successful invasion of Scotland, then under the regency of Randolph, Earl of Moray. Accompanied by some English noblemen, bent on recovering their forfeited estates in Scotland, he landed with a few hundred followers at Kinghorn, in Fifeshire; defeated the Earl of Fife; pushed boldly into the country and, on Dupplin Moor, in Perthshire, routed with immense slaughter an army more numerous than his own. On September 24 he was crowned King of Scotland at Scone. He acknowledged English suzerainty and promised to give up Berwick. He had enjoyed the kingly dignity for about three months, when he was surprised in his camp at Annan by a party of Scottish nobles and nearly lost his life as well as the crown. After the capture of Berwick, in 1333, he regained the throne. He was used as a tool by Edward III until 1356, when he surrendered to the latter the whole kingdom of Scotland. He died at Wheatley near Doncaster in 1367, and with him ended the house of Baliol. Consult Longman, *History of the Life and Times of Edward III* (London, 1869).

**BALIOL**, JOHN DE (1249–1315). Lord of Galloway, and King of Scotland from 1292 to 1296. On the death of Princess Margaret, in 1290, he became a competitor for the crown of Scotland. As the grandson of the eldest daughter of David, Earl of Huntington, brother of William the Lion, and grandson of David I, his claim was pronounced superior to that of his principal competitor, Robert Bruce, Lord of Annandale, son of a second daughter. The arbiter on the occasion was Edward I, of England, who found this a fit opportunity for asserting his claim as Lord-paramount of Scotland. This claim was acknowledged by the Scottish Estates in submitting the contest to his decision; and, consistently with this submission, Baliol, before and after receiving the crown (Nov. 30, 1292), swore fealty to Edward as his feudal superior. He was soon made to feel that his sovereignty was merely nominal, and the indignities which he experienced roused him to an assertion of his rights as king. With the advice of his nobles, he concluded an alliance in 1295, with France, then at war with England—an act of revolt followed by speedy chastisement. Edward invaded Scotland with a large force, defeated the Scottish troops, took Baliol prisoner, and compelled him formally to surrender his crown, July 10, 1296. Baliol was held as a prisoner for three years, enjoying, however, a limited freedom and something of royal state. At the end of that time he was permitted to retire to his patrimonial estates in France, where he died

in 1315. The estimate by his subjects of this prince was significantly indicated by the surname of Toom Tabard or 'Empty Jacket.' Consult Burton, *History of Scotland*, vol. ii (Edinburgh, 1905), and Lang, *History of Scotland*, vol. i (Edinburgh, 1904).

**BALIOL,** MRS. MARTHA BETHUNE. The imaginary narrator of some of Scott's *Chronicles of the Canongate.*

**BALIOL COLLEGE.** See BALLIOL COLLEGE.

**BALISARDA,** bä'lē-sär'dä. A magic and all-penetrating sword, mentioned in Ariosto's *Orlando Furioso.* It was made by a witch, Falerina, to kill Orlando.

**BALISAUR,** bāl'ī-sä'ur. An East Indian badger. See BADGER.

**BAL'ISTRA'RIA** (LL. *balistra*, Lat. *ballista*, crossbow). One of the names given to those narrow apertures so common in the walls of old castles through which the crossbowmen discharged their bolts. Their lower terminations are generally circular, but sometimes in the form of a shovel. They do not seem to have come into use till the thirteenth century. See ARTILLERY; LOOPHOLES.

**BALIUAG,** bä-lē'wäg. A town of Luzon, Philippines, in the province of Bulacan (Map: Luzon, E 7) 13 miles north of Bulacan. It is the market for a rich agricultural region and is noted for a fine grade of bamboo hats which are manufactured in the town. In 1899 was established here the first municipal government in the Philippines under American occupation. The people of Baliuag are thrifty, progressive, and industrious. Pop., 1903, 15,936.

**BALIZE,** bä-lēz'. See BRITISH HONDURAS; BELIZE.

**BALKAN** (bâl-kän' *or* bąl'kan) **MOUN'TAINS** (Turk. high ridge; the ancient *Hæmus*). A mountain range in southeastern Europe, in the Balkan Peninsula, forming a continuation of the Carpathian system. As such they may be considered to begin at the western extremity of the Transylvanian Alps, at the gorge known as the Iron Gates of the Danube, where the boundaries of Hungary, Rumania, and Servia meet. Thence they extend due south through Servia and along the borders of Servia and Bulgaria, then bend abruptly to the east, and continue in that direction as far as Cape Emineh, on the Black Sea (Map: Balkan Peninsula, E 3). Their western boundary attains the Morava-Vardar basins. The first section of the Balkans—that extending north and south—is formed by rounded hills and ridges, which attain an extreme elevation of about 7000 feet. The main range consists of several sections arranged successively along an east and west axis. They constitute the divide between the Danube and the Maritza watersheds and the boundary between Bulgaria and eastern Rumelia. In this main division, comprising the central Balkans, are the highest summits of the range, several of which exceed 7000 feet (Yümrücktchal, 7789; Kadimlia, 7410; Ambarica, 7052). The eastern Balkans, from the vicinity of Sliven to the Black Sea, consist of numerous ridges, usually less than 3000 feet high, and of more broken character than the mountains in the western and central sections. From the Balkans various ranges extend southward toward the Ægean, the principal being the Rhodope (Despoto-Dagh), whose summits overtop those of the Balkans. The islands of the Ægean form its southern prolongation. Among the passes of the Balkans may be mentioned the Troyan, Rosalita, and Shipka passes, which are at elevations of 4000 to 5000 feet. The Rilo Dagh is the most elevated peak in the Rhodope range. Its highest point is about 9900 feet. The Balkan range is composed largely of folded sedimentary strata; but in the west crystalline schists, containing deposits of copper, lead, and iron ore, are prominent.

**BALKAN PENIN'SULA.** A name commonly applied to the easternmost of the three great southern peninsulas of Europe, bounded by the Adriatic Sea on the west and the Black and Ægean seas on the east. Its northern boundary is generally considered to be the Danube, the Save and its tributary, the Kulpa. Thus defined, the peninsula comprises, within an area of about 175,000 square miles, the following countries: European Turkey, Bulgaria, Servia, Bosnia, and Herzegovina, part of Croatia, Dalmatia, Montenegro, Albania, and Greece.

The eastern coast of the peninsula, overlooking the Black Sea, is generally low and marshy and almost unbroken, except for the Gulf of Burgas. Through the Bosporus, a narrow channel about 20 miles long, the Black Sea communicates with the Sea of Marmora, which adjoins the peninsula on the southeast. The shores of the latter sea differ but little from those of the Black Sea in their general appearance. The Sea of Marmora communicates with the Ægean Sea through the Dardanelles channel. The coasts of the Ægean Sea form numerous gulfs and safe harbors of great commercial importance. The coasts of the Greek Peninsula are greatly indented and surrounded by numerous islands. The western coast of the Balkan Peninsula, above the Gulf of Arta, is generally mountainous. The greater part of the peninsula is covered with numerous mountain chains, the chief of which is the Balkan (q.v.), to which the peninsula owes its name.

Owing to the mountainous character of the country, the rivers which traverse the peninsula are mostly short, and very few of them navigable. The most important of them are the Maritza, Vardar, Morava, and Drin. There are also several lakes, the most important of which is that of Scutari. The climate is colder than in the other Mediterranean regions in the same latitude, and the snowfall during the winter is considerable.

The leading races of the peninsula are the Serbo-Croatians (Servians, Bosnians, Croatians, and Montenegrins) and Bulgarians, forming the southern branch of the Slav family, the Albanians, descendants of the ancient Illyrians, the Greeks, and the Turks. Since 1913 Turkish suzerainty has ceased in the peninsula, Bosnia and Herzegovina having been annexed by Austria-Hungary in 1908 and the remaining tributary territory having become independent as a result of the Balkan War of 1912–13. The Turks first obtained a foothold in the Balkan Peninsula in the middle of the fourteenth century, conquered Constantinople in 1453, putting an end to the Byzantine or Greek Empire, and soon after were masters of the whole peninsula. The Turkish Empire in Europe fell to pieces in the course of the nineteenth century, and at the present time Turkish rule extends over only about one-eighteenth of the region. The strife of nationalities is intense in the Balkan Peninsula and threatens at any moment to disturb the existing order. Consult: T. Fischer, "Die südosteuropäische Halbinsel" in *Länderkunde von*

*Europe*, vol. ii, part 2, 1890); Miller, *Travels and Politics in the Near East* (London, 1898); D. G. Hogarth, *The Nearer East* (New York, 1902); and Tuma, *Die ostliche Balkan-Halbinsel* (Vienna, 1886).

**BALKAN WAR.** The causes of the armed conflicts which occurred in the Balkans during the years 1912–13 were traceable to long-continued disorders in Macedonia and Albania, to a temporary union of all the Christian states of the Balkans, except Rumania, and to the weakening of the Ottoman Empire consequent upon the internal dissensions following the Turkish Revolution of 1908 and the military reverses suffered in the Turco-Italian War (q.v.).

Macedonia had been ceded by Turkey to Bulgaria in 1878 pursuant to the Treaty of San Stefano, but the Congress of Berlin in the same year revised this treaty and through the insistence of Great Britain and Austria-Hungary restored the district to Turkey. By Article XXIII of the Treaty of Berlin, however, the signatory powers bound themselves to establish an organic law providing for good government in Macedonia and to see that it was applied. For 34 years this promise was unfulfilled, despite the repeated protests of the Christian inhabitants—Bulgars, Greeks, and Serbs. Gradually as the small Christian states of the Balkans grew stronger they interested themselves increasingly in the welfare of their respective nationalities in Macedonia. A serious revolt of Macedonian Bulgars almost precipitated war between Bulgaria and Turkey in 1903; only the intense rivalry among the various Balkan states and their inability to agree upon any common division of European Turkey postponed an appeal to arms. Nevertheless the misgovernment and atrocities in Macedonia at once attracted general attention, and from 1903 to 1908 the European Powers, led at first by Austria-Hungary and Russia, endeavored to secure reforms in the Turkish administration. Austro-Hungarian and Russian civil agents obtained some supervision in the three vilayets of Saloniki, Monastir, and Kossovo; Italian officers undertook to reorganize the *gendarmerie;* and the Concert of Europe assumed direction of financial matters. Unfortunately the system was far from complete, and there was slight harmony among the Powers. Germany wished to meddle as little as possible with the administration of a Turkish province. Great Britain, on the other hand, supported by Russia, wished to go much farther. Accordingly in 1907 the British ministry proposed a new plan, including the reorganization of justice under the direction of European agents, and King Edward VII and the Czar met at Reval with their respective foreign ministers and agreed on a thorough programme of reforms.

At this juncture came the Turkish revolution of 1908 (see TURKEY), by which the progressive and radical Young Turk party overthrew the autocracy of the Sultan, set up a constitutional government, and loudly heralded the principles of equality and liberty. The European Powers believed in the good faith of the Young Turks and in their ability to remove the Macedonian abuses, and this confidence was shared by the subject races of Macedonia themselves. The foreign advisers were therefore speedily recalled from Macedonia, and the international programmes of reform fell into abeyance. It soon became evident, however, that the Turkish Revolution was directed not only against the Sultan's tyranny but against his feeble foreign policy which permitted the Powers to interfere in the internal affairs of the Empire. The revolution aimed at nationalization and centralization quite as much as at liberalism. In their desire to build up a strong, unified nation, the Young Turks introduced compulsory military service for Christians as well as for Moslems, but the realization of reforms promised by the Treaty of Berlin seemed more remote than ever. The special privileges long accorded to the subject races were curtailed; public meetings were prohibited; constitutional and national clubs were suppressed. This policy of Ottomanizing Macedonia had the effect of driving the people into more or less open rebellion. Lawless bands infested the country. Political assassinations were common. The repressive measures of the Turks served only to bring new recruits to the outlaws.

A very significant effect of the mistaken policy of the Young Turks was to draw the Christian nationalities together in common hatred of the Turks. From 1903 to 1908 the Serb, Greek, and Bulgar bands were as likely to massacre one another as to massacre Turks. Now they laid aside their rivalries. By the close of 1910 the Bulgars and Greeks in Macedonia who had long been the bitterest and most active in their hostility became fully reconciled, and this was followed by close and friendly relations between the governments of Greece and Bulgaria.

Another important result of the Ottomanizing policy of the new Turkish régime was disorder and insurrection in Albania. The turbulent chieftains and tribesmen of that province had been singularly loyal to the Ottoman Empire so long as their local customs and practices were respected, but as soon as the Young Turks undertook to abridge their privileges and to deprive them of arms, they rose in revolt. Every year from 1909 to 1912 was marked by desperate fighting in the mountains of Albania, each Turkish campaign becoming more expensive and less successful than the preceding one. In August, 1912, the Albanians submitted to the Turkish government a number of demands which included provision for a distinct judicial system—the restriction of Albanian military service in time of peace to the European vilayets, the use of the national language in civil administration, the establishment of schools, the undertaking of public works, the restitution of arms, and a general amnesty. The government was delaying its reply to these demands when the Balkan War broke out. With the Albanian situation both Montenegro and Servia were directly concerned, and Serb irregulars were to be found fighting shoulder to shoulder with Albanians in the insurrections of 1911 and 1912.

The same determined policy of the Young Turks which led to disorders in Macedonia and Albania brought on the Turco-Italian War of 1911–12, and the Italian occupation of Tripoli and Cyrenaica and seizure of twelve islands in the Sporades humiliated the Turkish government and fed the ambition of the Christian states of the Balkans. A definite understanding was reached in March, 1912, by the governments of Bulgaria, Servia, Greece, and Montenegro. Owing largely to the statesmanship of M. Venezelos, the Greek premier, jealousies and conflicting interests were not permitted to divide the states or keep them from their


BALKAN STATES
TURKEY, RUMANIA, BULGARIA, YUGO-SLAVIA, ALBANIA AND GREECE
SCALE OF STATUTE MILES
0 10 20 40 60 80 100 120 140 160
SCALE OF KILOMETERS
0 20 40 80 120 160 200 240
Important towns are shown in heavy face type
Railways shown thus
BUKOWINA
RUMANIA
MOLDAVIA
TRANSYLVANIA
WALLACHIA
BUKHAREST
SLAVONIA
CROATIA
BOSNIA
HERZEGOVINA
SERVIA
BELGRADE
BULGARIA
SOFIA
EASTERN ROUMELIA
Philippopolis
Adrianople
Constantinople
ALBANIA
MACEDONIA
Monastir
Salonica
Seres
THESSALY
EPIRUS
GREECE
ATTICA & BOEOTIA
ATHENS
PELOPONNESUS
ACHAIA & ELIS
ARGOLIS & CORINTHIA
MOREA
Corfu
CEPHALONIA
SANTA MAURA
ITHACA
ZANTE
THASOS
SAMATHRAKI
IMBROS
LIMNOS
TENEDOS
MITYLENE
NORTHERN SPORADES
GRECIAN ARCHIPELAGO
CYCLADES
SCIROS
SKYROS
EUBEA
NEGROPONT
NIKARIA
SAMOS
PATMOS
LEVITHA
KOS
NISYROS
TILOS
ANDROS
TINOS
MYKONOS
HERMOPOLIS
SYRA
DELOS IS.
STAPODIA
PATMOS
SERIPHOS
SIPHNOS
PAROS
NAXOS
KAROS
AMORGOS
IOS
SANTORINI
ANAPHE
ST JOHN I.
THERASIA
ASIA MINOR
Smyrna
Aidin
Sokia
Scalanova
Tchesme
KHIOS
Alvalyk
Bergama
Mitylene
Edremid
Baba Kalessi
Balikesri
Manisa
Gedis or Saradol
Akhissar
Alasher
Simav
Brusa
Bigha
Gallipoli
Lapsaki
Karabigha
Malgara
Rodosto
Silivri
Sentari
Derkos
Killia
Bosporus
Black Sea
Sea of Marmora
PRINCES IS.
KALOLIMNI
Gulf of Saros
Dedeh Agatch
Enos
Maritza R.
Tundja R.
Arda R.
Vardar R.
Struma R.
Drin R.
Danube
Save R.
Morava R.
Theiss R.
Pruth R.
Dniester R.
Bug R.
Kilia Mouth
Mouths of the Danube
St George Mouth
Hortuje Mouth
Sulina
St George
Iron Gates
Orsova
Turnu Severin
Gladova
Strehaia
Fetesti
Calafat
Kalafat
Widin
Rahova
Kalafat
Turtukai
Rustchuk
Giurgevo
Oltenitza
Silistria
Tutrakan
Varna
Shumla
Pravadi
Eski Stambul
Aidos
Karnabad
Slivno
Dobrol
Karabunar
Burghas
Bunarkessik
Kirk Kilisseh
Lüleh Bergas
Baba Eskeri
Sarai
Tchorlu
Rodosto
Silivri
Tchekmekdji
Derkos
Killia
Sentari
Rumeli Kavak
Beikos
Tchataldja
Buyuk Tchekmedje
Kutchuk Tchekmedje
Makrikeui
Ismid
Nicomedia
Gulf of Ismid
Gulf of Nicomedia
Gulf of Mudania
Mudania
Moudros
Kastro
Port Iero
Port Kastro
Port Moudros
Port Paleokastro
Port Kalamaki
Port Kondia
Port Pisco
Port Sigri
Port Suda
Port Retimo
Port Candia
Port Milo
Port Argostoli
Port Vathy
Port Leivathos
Port Vathi
Port Santa Maura
Port Dragomestre
Port Vasiliki
Port Phanari
Port Vitylo
Port Kalamata
Port Koroni
Port Navarino
Port Modon
Port Methoni
Port Longo
Port Gargaliani
Port Arkadia
Port Kyparissia
Port Phanaraki
Port Malia
Port Hieraka
Port Marathonisi
Port Monemvasia
Port Kastri
Port Kalamaki
Port Vathy
Port Leivathos
Port Vathi
Port Santa Maura
Port Dragomestre
Port Vasiliki
Port Phanari
Port Vitylo
Port Kalamata
Port Koroni
Port Navarino
Port Modon
Port Methoni
Port Longo
Port Gargaliani
Port Arkadia
Port Kyparissia
Port Phanaraki
Port Malia
Port Hieraka
Port Marathonisi
Port Monemvasia
Port Kastri
CRETE OR CANDIA
(To Greece)
Same scale as main map
SEA OF CANDIA
CERIGOTTO
CERIGO
Longitude E East 26° from F Greenwich

central purpose. The alliance was formed to free the men of their religion and race from Turkish rule and to overthrow and dismember the Ottoman Empire in Europe.

Greece, Servia, and Bulgaria naturally sympathized with the people of their own nationality in Macedonia. Montenegro likewise sympathized with the Albanian rebels, and the Turks complained of frequent attacks by Montenegrins on the border. In Bulgaria public opinion was greatly agitated by a massacre at Kotchana in August, 1912. As to Servia, one of the many incidents that angered the people was a massacre of Serb Christians at Senitza in Novibazar in July. The emotions of the Greeks were stirred by reports of Turkish atrocities in Thessaly and by the clamorous appeals of the Cretans for annexation to the Greek kingdom, which had been increasing ever since the Græco-Turkish War of 1897 (q.v.).

These threatening conditions led the Porte in July, 1912, to announce its intention of introducing judicial, economic, educational, and administrative reforms in Albania. The rather vague assurance was extended to Macedonia in September, and in October the Turkish government revived the vilayets law of 1880, which constituted local autonomous councils, half of whose members, however, were to be appointed by the governor. Such tardy concessions could not stay the crisis, for the Balkan allies were by this time unitedly insisting upon a far more radical programme — national autonomy for Macedonia, Christian governors of the European vilayets, local militia, and the withdrawal of Turkish troops. Announcement that Turkey would hold army manœuvres near Adrianople was followed by orders for the mobilization of Bulgarian, Servian, Greek, and Montenegrin forces. By Oct. 8, 1912, nearly half a million men threatened the Ottoman Empire from the north, while over 100,000 Greeks were massed on the Thessalian frontier. The Turks retaliated by confiscating munitions of war intended for the allies and by holding up about 100 Greek merchant vessels.

Meanwhile the Great Powers had been attempting to prevent war. A conference on September 8 of the German Chancellor with Count Berchtold, Foreign Minister of Austria-Hungary, resulted in an expressed determination of the two governments to maintain the territorial *status quo* in the Balkans and to avert hostilities by encouraging the Porte in its "policy of decentralization"; and Austria-Hungary speedily mobilized an army with the avowed intention of protecting her interests in the sanjak of Novibazar. A proposal of the French foreign minister, M. Poincaré, for concerted diplomatic action, tardily assented to by Great Britain, led to representations by the ministers of Russia and Austria-Hungary, acting as mandatories of the Powers, at the Balkan capitals, on October 8, to the effect that (1) the Powers would reprove any belligerent action; (2) they would assist in securing, under Article XXIII of the Treaty of Berlin, reforms in the administration of European Turkey that would not infringe upon the sovereignty of the Sultan or the territorial integrity of the Ottoman Empire; (3) in case of war, they "would not permit at the end of the conflict any modification of the territorial *status quo* in European Turkey." On the very same day Montenegro severed relations with the Porte and declared war.

On October 13 Bulgaria, Servia, and Greece dispatched an identical note to Turkey requiring the establishment of complete Macedonian autonomy under Christian governors within six months. Upon receipt of the note Turkey immediately recalled her representatives from their respective capitals. Formal declarations of war against Turkey were issued on Oct. 17, 1912, by Greece, Servia, and Bulgaria.

The military plans of the four Balkan powers were well coördinated and directed to a common purpose. The chief objective of the Montenegrin campaign was Scutari. The Servians aimed at defeating the Turkish forces in Macedonia in coöperation with the Montenegrins in the west and the Greeks in the south and then to dispatch troops to seize the port of Durazzo on the Adriatic. The Greek attack was directed to the capture of Saloniki. The Bulgarians, whose forces were the strongest, were to perform the chief task of overwhelming the Turks in Thrace and pushing them back to Constantinople. Thus the Turks were attacked at the same time in four separate regions and were unable to concentrate and act on the offensive. Their commander-in-chief was Nazim Pasha, who was appointed on October 3. It was soon perceived that in the face of the vigorous and rapid assault of the Balkan armies the Turkish military organization had fallen into a deplorable state of inefficiency and unreadiness.

On the northeast Bulgarian forces, aggregating over 300,000 men, commanded by General Savoff (q.v.), occupied Mustapha Pasha on October 19 and Kirk-Kilisseh on the 24th. By the 27th Adrianople was invested, the garrison of 60,000 men henceforth making vigorous but unsuccessful sorties. On the 27th the Bulgarians captured Eski-Baba; and two days later began the sanguinary battle of Lule Burgas, the chief battle of the war, extending along a front of about 22 miles. Three attacks on the Turkish centre were repulsed, and the position was finally carried only after a hand-to-hand encounter. The Bulgarian generals did not restrain the ardor of their troops, and movements, especially infantry charges, involving heavy sacrifices of life, were carried out with remarkable heroism. The losses on each side were very heavy. The Turks were ill-supplied with food and ammunition and suffered also from defective leadership. The well-directed Bulgarian artillery fire wrought havoc among them. At last they began to retreat, but without panic, and fighting did not actually cease until November 2. The strength of the Turkish army engaged at Lule Burgas was placed at 150,000. Their loss in killed and wounded was about 35,000 and in prisoners about 3000. The Bulgarian loss was estimated at 15,000.

The Turks now fell back on Tchorlu and a little later withdrew behind the strong Tchatalja forts, the last line in defense of Constantinople. On November 12 the Bulgarians began their attack, but the Turks successfully stood their ground. To carry the defenses involved heavy loss, and it was hoped that the cholera, which had broken out among the Turks, would lead them to surrender. The Turks opened negotiations for an armistice on November 13, and operations were suspended, but when the allies presented their terms on November 20, they were at once rejected. On November 25, however, a meeting was arranged between General Savoff of the Bulgarians and Nazim Pasha, the Turkish

commander-in-chief and Minister of War, and three days later the negotiations were definitely resumed at Tchatalja. Finally, on December 3, a protocol was signed for an armistice which was to last until the end of the peace negotiations.

Meanwhile, in the western field of war, Servian forces took Prishtina on October 22, Novibazar on the 23d, and Senitza on the 26th. On the same day Uskub was occupied. Many of the Turks scattered in panic, but the main body withdrew toward Monastir. On October 27 the Servians, after driving the Turks back with heavy losses from Kotchana and Ishtib, captured Kuprulu. The Turks came to a stand in a narrow defile of the mountains between Kuprulu and Perlepe, whence the Servians tried to dislodge them on November 3. This was accomplished, but only after a long battle, in which the Servians suffered heavily. Meanwhile one portion of their army had been dispatched in the direction of Scutari to coöperate with the Montenegrins, another toward the coast at Durazzo, and a third to join the Greeks in the neighborhood of Saloniki. But the main body advanced to Monastir, which, after two days of desperate fighting, was captured on November 18. The last important success of the Servians was the occupation of Durazzo on November 28. The victorious advent of Servia on the Adriatic coast gave rise to international complications noted below.

The Greeks, under Crown Prince Constantine, invading Macedonia from the Thessalian frontier, had already occupied Elassona, won successes near Mount Olympus, in the Melina Pass, and at Damsei, gained an important victory at Saranporo Pass on October 23, and on the following day captured the town of Servia. By the 31st they had occupied Verria on the Saloniki-Monastir Railway and had routed a Turkish detachment at Kailar. On November 3 their main column occupied the "holy town" of Yenidje and advanced thence on Saloniki, in conjunction with a detachment which had been landed at Stavros and with a Bulgarian force from Kuruk. The condition of the Turks in the defense of Saloniki was deplorable, and they were unable to offer effective resistance. After a two days' investment the town was surrendered on November 8. The number of the Greeks was placed at about 60,000 and of the Turks at about 25,000. A Bulgarian division and a Servian regiment entered Saloniki on November 9, and there were henceforth many evidences of jealousy among the allies. A Greek expedition against Janina had not attained its object when the armistice of Tchatalja was signed on December 3; Greece therefore declined to agree to the armistice and continued operations on land and sea. During the autumn and winter Greek warships managed to capture all the Ægean islands not already occupied by Italy.

The Montenegrins began their advance on Scutari on October 8. On the 12th they invested Tarabosch and on the 14th captured Tuzi. Essad Pasha, the Turkish commander, contested their advance at each mountain stronghold, but was at length obliged to take refuge within the fortress of Scutari. In the west Berane was taken on October 16, and toward the east Prizrend and Ipek on the 31st. South of Scutari another army of Montenegrins and Servians occupied Alessio and San Giovanni di Medua on November 5.

Ever since the outbreak of war the European Powers had continued their efforts in behalf of peace. M. Poincaré, the French premier, proposed early in November that the Powers should pledge themselves to "territorial disinterestedness," but this did not meet with favor among the members of the Triple Alliance, of whom Austria-Hungary occasioned the chief apprehension. She was known to be hostile to any movement that would bring Servia to the Adriatic or, by imposing a barrier of Slav states, cut Austria-Hungary off from the road to Saloniki. Toward the end of November Sir Edward Grey, the British Foreign Secretary, proposed that representatives of the Powers should be especially authorized to confer on the Balkan question at one of the European capitals. This was accepted, and London was designated as the place for the conference. Soon after the appearance of the Bulgarians before the Tchatalja lines, Turkey asked the Powers to mediate and received the reply that no terms unacceptable to all the belligerents would be forced upon them.

By the armistice signed at Tchatalja on Dec. 3, 1912, Bulgaria, Servia, Montenegro, and Turkey agreed to send delegates to a peace conference at London. During the armistice the armies were to retain their positions, and the besieged fortresses of Adrianople and Scutari were not to be reprovisioned. Greece, as has been seen, refused to accede to this agreement, while Janina remained in Turkish hands and continued her attacks on that city. Nevertheless, at the first session of the peace conference in London on December 16, the Greeks insisted on a share in the deliberations. The Turks, after some delay and efforts to obtain a counter-concession, yielded on this point. The territorial demands which the allies submitted December 23, comprising the cession of all territory west of a line from Rodosto to Cape Malatra, of the Ægean islands and of Crete, were refused by the Turkish diplomats, and the conference was suspended by the allies on Jan. 6, 1913. On the 16th the Porte was advised by the Powers to yield on the question of the surrender and cession of Adrianople. After receiving the assent of a Council of Notables on January 22, the Turkish government proposed to compromise on the division of Adrianople and the autonomy of the Ægean Islands.

These concessions were insufficient to satisfy the allies, and on Feb. 3, 1913, there was a general resumption of hostilities. The Bulgarians with Servian help pressed the attack on Adrianople; two forts were taken on March 9; and on the 26th the whole eastern line of defenses was carried and the Turkish commander, Shukri Pasha, was compelled to surrender with some 30,000 men. A vigorous attack was then made on the Tchatalja line; the town of Tchatalja was taken, and Bulgarian detachments occupied Delepes, Injes, Subachu, and Serbele. Meanwhile the Greeks had captured Janina, March 6; the siege of Scutari had been urgently prosecuted by Montenegrin and Servian troops; and Greek ships in the Adriatic were coöperating with the allied forces in northern Albania.

Further mediation of the Powers was impeded by their clashing interests. The moral support which Russian sentiment gave to the Greek-Christian Slavic Balkan states brought Russia into sharp conflict with the Austro-Hungarian "expansion to Saloniki" policy. After the resumption of hostilities between the

Turks and the allies, the attention of the Powers was directed to the settlement of conflicting claims to Albania. In deference to the strenuous representations of Austria-Hungary, they agreed to incorporate Scutari in an autonomous Albanian state and to forbid the acquisition by Servia of an Adriatic port, although Servia was to be given commercial access to the Adriatic over a neutral railway. In return, the Triple Entente secured for Servia and Montenegro the debatable territories of Ipek, Prizrend, Dibra, and Djakova. The northern and eastern frontiers of the new principality of Albania were accordingly agreed upon by the Powers on March 26, 1913. The immediate result of this agreement was the relaxation of Austro-Russian tension and the simultaneous withdrawal of Russian and Austro-Hungarian troops from the Galician frontier. With the consent of the Porte, the Powers renewed on March 1 their offer of general mediation in the struggle. Two weeks later the allies were willing to accept the good offices of the Powers on condition that the western boundary of Turkey should be the Rodosto-Malatra line, that Crete and the Ægean islands should be ceded, and that an indemnity should be paid by Turkey. The Powers, unwilling to give Bulgaria a foothold on the Dardanelles, insisted on a line from Enos to Midia by way of the Maritza and Ergene rivers; and as both Italian and German interests opposed the union of the Ægean islands with Greece, the Powers offered to determine later the status of those islands. On April 1 the Porte was ready to accept a direct line from Enos to Midia, and the allies were finally induced to agree to mediation, reserving the right to discuss with the Powers the claim for $300,000,000 indemnity, the disposition of the Turkish national debt, the status of the Ægean islands, and the delimitation of the boundaries in Thrace and in Albania.

On April 19, 1913, a second armistice was signed at Bulair by all the belligerents except Montenegro. The announced decision of the Powers to incorporate Scutari in Albania only incited King Nicholas to redouble his efforts to capture that city. An international fleet under the command of the British Admiral Burney attempted to punish this defiance by blockading the coast from Antivari to San Giovanni di Medna on April 10. Unintimidated, the Montenegrins continued the siege, captured Scutari on April 23, and then at once acceded to the armistice of Bulair. For a while it was feared that negotiations looking toward a definite peace would be complicated by serious differences among the Powers concerning the fate of Scutari. Although the European Concert had already declared that Scutari should be incorporated in an autonomous Albania, the unexpected triumph of the Montenegrins aroused a storm of pan-Slavist sentiment in Russia. It was only the determined attitude of Austria-Hungary and the loyal support of her allies that forced King Nicholas to evacuate Scutari. On May 14, 1913, the city was occupied by an international military force in the name of the new principality of Albania.

As soon as Montenegro had grudgingly submitted to the Powers, delegates of the Balkan allies and of Turkey opened the second London Conference for the discussion of the terms of a general peace. Warned by Sir Edward Grey that the Powers would not tolerate protracted deliberation, such as had wrecked the first London Conference, the Balkan diplomats came to an agreement late in May. By this Treaty of London, signed on May 30, 1913, it was stipulated that Turkey should surrender to the allies Crete and all territory on the European mainland west of the Enos-Midia line; that the delimitation of the Albanian frontiers and the disposition of the Ægean islands should be left to the adjudication of the Powers; and that financial questions incident to the readjustments should be submitted for decision to an International Commission at Paris.

Thus, within eight months, the Ottoman Empire had been shorn of all her European possessions except Constantinople and a small tract of adjacent land east of the Maritza River. But the surprising rapidity and ease with which this result had been achieved only whetted the ambition of each of the Balkan states to secure the bulk of the spoils. On one hand, Bulgaria claimed the greater part of Macedonia, including Saloniki and Monastir. On the other hand, Servia demanded a greater share of Macedonia than had been allotted to her in the Serbo-Bulgarian treaty of March, 1912, and Greece was insistent upon retaining both Saloniki and Kavala, which her troops had occupied. Rumania, too, had long been clamoring for a "strategic frontier" and for compensation from Bulgaria in return for her own neutrality during the Balkan War. In this emergency the Czar offered his services as mediator, but was petulantly refused. Inspired with a false confidence in the prowess of their army and possibly encouraged by Austro-Hungarian machinations, the Bulgarian government drifted rapidly into a second war, this time with their former allies and with Rumania and Turkey as well. Bulgarian troops took the offensive against the Greeks in the Panghaion district and engaged the Servians in a three days' battle at Slatovo. The new war, thus begun on June 30, was not formally recognized until July 5–6, when Bulgaria completed the diplomatic rupture with Greece and Servia, and Montenegro declared war against Bulgaria. On the 10th Rumania proclaimed hostilities, and almost simultaneously the Turks took advantage of the discord among their enemies and the withdrawal of the Bulgarian army from Tchatalja to advance in force toward Adrianople. Against such overwhelming odds the Bulgarian armies contended in vain. On the north the Rumanians quickly occupied Turtukai and Baltchik and dispatched a column to threaten Sofia. On the south Adrianople was retaken with ease by the Turks on July 22. The advance of the Greeks from the southwest was more stubbornly resisted, but by the end of the month the armies of King Constantine had possessed themselves of all the important towns along the railway between Doiran and Dedeagatch and were advancing up the Struma River toward the Bulgarian boundary and the city of Sofia. Meanwhile on the west the Servians with Montenegrin aid had repulsed Bulgarian attacks and closed in upon Kotchana and were preparing to descend through the Osogovska Pass upon the Bulgarian town of Kustendil and thence converge with their other allies upon Sofia. Anxious to avoid further calamities, King Ferdinand sued for peace.

After a week's conference at the Rumanian capital of the representatives of all the Balkan

states, except Turkey, the Treaty of Bucharest was signed on August 6. Rumania of course secured an extension of her southeastern frontier as far as the Turtukai-Baltchik line. Bulgaria was obliged to abandon Kotchana and Radovisht to Servia, and Saloniki, Doiran, Demir-Hissar, Seres, Drama, and Kavala to Greece. In making this cession Bulgaria retained the town of Strumnitza in Macedonia and some 60 miles of seacoast on the Ægean between the mouths of the Mesta and Maritza. The Serbo-Greek boundary was so determined by the Treaty of Bucharest that Monastir became Servian and Vodena and Florina fell to Greece. Subsequently Montenegro received from Servia, as compensation for assistance in the two wars, approximately a half of the sanjak of Novibazar, including Plevlye, Byelopolye, Ipek, and Djakova. For a brief period it was believed that the Treaty of Bucharest, concluded without much regard to the nationalities of the peoples in the distributed territories, would be revised by Russia or by Austria-Hungary. The new arrangement, however, was upheld by France and Germany, and the Dual Monarchy could hardly demand a change after the German Emperor had congratulated Rumania and Greece upon the settlement.

It still remained for Bulgaria once more to settle with the Turks the status of Adrianople. Bulgaria had counted upon the Powers to enforce the provisions of the Treaty of London, but now, unfriended and isolated, she was obliged to send General Savoff to negotiate a new treaty with the Porte. The Turks were not content even with the Maritza River as the boundary, but, making the most of their enemy's weakness, they compelled the Bulgarian envoy to renounce his claim to Kirk-Kilisseh and Demotika. By the Treaty of Constantinople, signed Sept. 29, 1913, the Turco-Bulgarian line would follow the Maritza from its mouth to a point near Mandra and thence, passing west of Demotika, would leave both that town and Adrianople to Turkey; near Adrianople the line would bend eastward and, passing north of Kirk-Kilisseh and south of Malko Tirnovo, would terminate on the Black Sea at Sveti Stefan. Bulgaria emerged from the conflict discredited and deprived not only of Adrianople but also of the control of railway connections with Dedeagatch, her single new port on the Ægean.

While the Second Balkan War was in progress, the Ambassadors' Conference of the Powers at London was fixing the southern frontier of Albania. On August 11 announcement was made that it would run from a point south of Cape Stylos to Lake Ochrida, incorporating the district of Koritza in Albania, much to the vexation of the Greeks. With the government of Albania as well as with the boundaries of the new state, the Powers were concerned. About October 1 they set up at Valona an International Commission of Control, consisting of six members, representing Austria-Hungary, Italy, Russia, Germany, France, and Great Britain. Late in October it was announced that the Powers had agreed to nominate as first prince of autonomous Albania Prince William Frederick of Wied, a German subject and a relation of Queen Elizabeth (Carmen Sylva) of Rumania. Consult: Lane, *Peace Theories and the Balkan War* (London, 1912); H. Callan, "Lands and Peoples of the Balkans," in *Scottish Geographical Magazine* (Edinburgh, 1898); Lyde, *A Military Geography of the Balkan Peninsula* (London, 1905); E. Ashmead-Bartlett, *With the Turks in Thrace* (London, 1913); H. Wagner, *With the Victorious Bulgarians* (London, 1913); *The Balkan War Drama*, by a special correspondent (London, 1913); Pierre Loti, *Turquie agoniste* (Paris, 1913).

**BALKES**, bäl'kēs (more correctly BILKIS). The name "Arabian legend" gives to the Queen of Sheba, who married Solomon and bore him a son. She is alluded to in the 27th surah of the Koran and in Beckford's *Vathek* (q.v.).

**BALKH**, bälk. A district of Afghan Turkestan, corresponding to ancient Bactria. It is bounded on the north by the river Amu, on the east by Badakhshan, and on the west by the desert. Offsets of the Hindu-Kush traverse it in a northwestern direction, and slope down to the low steppes of Bokhara. Its area is approximately 5000 square miles. The soil has the general characteristics of a desert land; only a few parts are made fertile by artificial irrigation. The climate shows great variation. The commercial importance of the district greatly diminished with the discovery of the sea route around the Cape of Good Hope. The inhabitants, whose number cannot be ascertained, are Usbeg Tatars and range in character and occupation from plunderers of caravans to tillers of the soil and artisans.

**BALKH**, bälk (Turk. high town; anciently, *Bactra*). The chief city of a district of the same name, in Afghan Turkestan, situated where the Balkh River separates in numerous canals, about 23 miles south of the Amu-Darya, or Oxus River (Map: Asia, Central, K 3). It is surrounded by a mud wall; but though bearing the imposing title of Amul-Balad ('mother of cities'), little survives of the grandeur of ancient Bactra, on the site of which it is built, and Mazar-i-Sherif has usurped most of its importance since an outbreak of cholera in 1872. It contains a mosque, a citadel, and several half-ruined schools. It was twice destroyed by Genghis Khan and Timur, and in 1825 it was plundered by the powerful ruler of Kunduz, Mir-Murad-Bei. Balkh is reputed to have been at one time the centre of the Zoroastrian religion. There is a new town of the same name a short distance to the north of Balkh. The population is estimated at from 8000 to 15,000.

**BALKHASH**, bäl-käsh' (probably the *Vouru-Kasha* of the Avesta; *vouru*, great + *kasha*, lake). The fourth lake in size on the Eurasiatic continent, near the eastern borders of Russian Central Asia, in lat. 45° and 48° N., and long. 75° and 79° E. (Map: Asia, G 4). It was formerly connected with the smaller lakes lying beyond its eastern end, but it is now dwindling gradually in size. It has an area of 8600 square miles, and stretches from southwest to northeast over a distance of 330 miles; its breadth varies from 6 miles in the eastern part to 54 miles in the western. With the exception of its northern coast, the shores of Balkhash are so low that it is often difficult to locate their outline. The lake is shallow, navigation irregular, and the fisheries unimportant. It is frozen from November to April. Its waters are usually extremely saline except at the mouth of the rivers which empty in it. It has several feeders from the southeast, the principal of which is the navigable river Ili. The largest of several islands is Utch-Aral, near its western shore.

**BALL** (OHG. *balla*, Ger. *Ball*, Fr. *balle;* cf. Eng. *bale*, a round pack). The ball was to the primitive man not an implement of sport, but an absolute necessity of existence. The first were stones rounded by the action of tide or current, and man used them with a sling to crush in the forehead of the beasts upon whom he fed. Specimens of the *Bos primigenius* so slain have been exhumed from ancient bogs. The slaying of Goliath by David will immediately come to mind as an instance in which the stone ball from the brook was used as a weapon of offense. Hannibal's Balearic slingers, in the second Punic War, demoralized the Roman infantry by the terrible execution they did while yet at a distance and out of sight. The sling remained a part of the equipment of the English army until the fifteenth century. The South Americans had a modification of the sling in their *bolas*. They attached a ball to each end of a thong, with another in the centre to hold by and get the necessary impetus. These were thrown and twirled round the legs of a distant and fleeing animal, bringing it to earth.

As an aid to outdoor activities and sports the ball claims a venerable antiquity. Thus, one of the most beautiful episodes in the *Odyssey* is the description of Nausicaa and her maidens, in which, as rendered by Pope,—

> "O'er the green mead the sportive virgins play,
> Their shining veils unbound—along the skies,
> Tos't and retos't the ball alternate flies."

The ball games of the Greeks came to be much valued as a means of giving grace and elasticity to the figure, and in the special rooms provided for them in the gymnasiums they were played almost daily by persons of all ages and ranks. A teacher (*pilicrepus*) was in attendance, and certain rules and gradations of the exercise were observed, according to the physical condition of the player. The Romans also practiced ball playing in connection with their baths, but it never assumed the importance attached to it by the Greeks. Of the various kinds of balls used by them, the commonest were the *pila*, a handball stuffed with hair, and the *follis*, a large inflated skin, like a football. There were several recognized games, vaguely resembling handball and football; and in the Byzantine period a game distinctly similar to the modern polo was played on horseback by the nobles.

Ball playing seems to have been of great antiquity in the west of Europe also. In the sixteenth century it was in great favor in the courts of princes, especially in Italy and France. Houses were built for playing in all weathers, and in gardens long alleys were laid out for the purpose, the names of which still adhere to many localities. Thus, one of the most famous streets in London takes its name from the Italian *palla*, 'a ball,' and *maglia*, 'a mallet'—the game thus denoted being described in Blount's *Glossographia* (1656): "Pale Maille: a game wherein a round bowle is with a mallet struck through a high arch of iron (standing at either end of an alley), which he that can do at the fewest blows, or at the number agreed on, wins. This game was heretofore used in the long alley, near St. James's, and vulgarly called Pell-Mell."

From the *jeu-de-paume* of the Middle Ages came the modern tennis, racquets, and lawn tennis. The origin of football is equally remote. It has been discovered in regions as far apart as the Faroe Islands in the north, New Zealand in the south, and the Philippines in the tropics. A peculiar kind of game with an inflated ball was played by the Indians of the Amazon; they threw it in the air, and shot at it from opposite directions with blunt arrows. The game of lacrosse originated with the North American Indians, and evidently could have had no connection with the Oriental games, though it is not unlike them in several respects. But in all these questions of origins the historical data are so meagre and the modifying influences of various games upon one another have been so general that the true history of few games can be completely told. Besides the many famous games of universal acceptance in which the ball is the prime factor, there are many less-known sports, popular in certain localities, which are in the same way dependent upon it. The Frenchmen play the game of the hammer, hitting a ball along the highways; the Italians play *pallone* by striking the ball with a rubber casing worn over the hand. The Spaniards are devoted to their *fronton*, which is akin to handball. Even the Eskimos have their ball game to while away the tedium of the long winter; and marbles are too universal to be restricted to any locality or period. See BASEBALL; FOOTBALL, TENNIS; BASKET BALL.

**BALL.** Ammunition for firearms or ordnance. Before the era of hollow or elongated shells and bullets, all projectiles were solid and spherical. The term "ball ammunition" or "ball cartridge," however, is still used as a distinction from "blank ammunition." In military pyrotechny, "balls" in many varieties are used, either to give light, produce dense smoke, or diffuse suffocating odors. In these latter respects, however, they are, under modern conditions, rarely if ever used. See AMMUNITION; ORDNANCE; PROJECTILES.

**BALL,** ELMER DARWIN (1870– ). An American entomologist, born at Athens, Vt. He was educated at Iowa State College and Ohio State University. From 1902 to 1907 he was professor of zoölogy and entomology in the Utah Agricultural College, at the end of this period becoming director of the Utah Experiment Station. In 1909 he was appointed director of the School of Agriculture in the Utah Agricultural College, and a year later held the presidency of the Utah Academy of Science. His writings include systematic studies of the life histories of the Cercopidæ Jassidæ and the Fulgoridæ, and also contributions on the economic effects of grasshoppers, codling moths (1907), and sugar-beet leaf hoppers (1907 and 1909).

**BALL,** JOHN (?–1381). An English preacher, well known for his connection with the Wat Tyler Insurrection in 1381. It was Ball who preached from the famous text:

> "When Adam dalf, and Eve span,
> Who was thanne a gentilman?"

He was executed at St. Albans on July 15, 1381. See TYLER'S REBELLION.

**BALL,** SIR ROBERT STAWELL, LL.D. (1840–1913). An English astronomer, born at Dublin, Ireland. He was educated at Trinity College, Dublin, and became, successively, professor of applied mathematics and mechanism at the Royal College of Science for Ireland; professor of astronomy in the University of Dublin; professor of geometry and astronomy at the University of Cambridge. He wrote *Elements of*

*Astronomy* (1880; 1900); *The Story of the Heavens* (1885; 1905); *The Story of the Sun* (1894); *Great Astronomers* (1895; new ed., 1906); *The Earth's Beginning* (1901; new ed., 1909); *Popular Guide to the Heavens* (1905; 3d ed., 1913); *Natural Sources of Power* (1908); *A Treatise on Spherical Astronomy* (1908); *A Primer of Astronomy* was reissued in 1911; besides many magazine articles, essays, lectures, and reviews. He was elected a Fellow of the Royal Society in 1873, was astronomer-royal of Ireland (1874–92), and in 1892 was made director of the Cambridge Observatory. At various times he was president of the Royal Astronomical Society, of the Mathematical Association, and of the Royal Zoölogical Society of Ireland. He was knighted in 1886. In 1902 he visited the United States and addressed several public or semi-public meetings.

**BALL**, THOMAS (1819–1911). An American sculptor, the most important of the early middle period. He was born at Charlestown, Mass., March 6, 1819, the son of a house and sign painter, and on the early death of his father undertook the support of the family. His employment as a boy-of-all-work in the old New England Museum, Boston, turned his attention to art and led him to the study and practice of portrait painting. His first attempt in sculpture was a small bust of Jenny Lind, and this was followed by other cabinet busts of musicians of his acquaintance—for Ball was an amateur musician of great ability, being the first in America to sing the basso of Elijah. A life-size bust of Daniel Webster brought great success and assisted his departure for Florence in 1854. After two years' study he returned to Boston and was in 1860–64 engaged in modeling his celebrated "Washington" (unveiled 1869), the first equestrian statue in New England and by far the best of any type so far produced. In 1865 he returned to Florence, where he spent most of his later life. Among the more important of his later works are: Edwin Forrest as "Coriolanus" (1867), now in the Actors' Home, Philadelphia; "Eve stepping into Life," considered by the sculptor as his most important work; "La Petite Pensée," a well-known ideal head; "St. John the Evangelist" in Forest Hills Cemetery, Boston. In 1875 his celebrated "Emancipation Group" in Washington (replica in Boston) was unveiled—a bronze representation of Lincoln freeing a kneeling slave and a work of real inspiration; in 1876 was completed the colossal bronze figure of Daniel Webster in Central Park, New York; and in 1878, the statue of Josiah Quincy before the City Hall, Boston. At 70 years of age Ball began his most ambitious and probably his greatest achievement, the Washington monument at Methuen, Mass. It consists of a great block of Carrara marble, surmounted by a collossal bronze figure of Washington; at the base are four seated figures representing Oppression, Revolution, Victory, and Cincinnatus, and above these the busts of Washington's four principal generals. The sculptor's last years were spent in Montclair, N. J.

Ball is one of the most important figures in the development of American sculpture, for which he set a new standard both in craftsmanship and in ideals. To an observer accustomed to the subtleties of present-day modeling, the surfaces and textures of his statues seem oddly smooth; but the figures are always truly sculpturesque and are serious and dignified in conception. He published an autobiography entitled *My Threescore Years and Ten* (1891) and a number of lyrics and other poems. Consult Taft, *History of American Sculpture* (New York, 1903).

**BALL**, WALTER WILLIAM ROUSE (1850– ). An English mathematician. He was educated at University College, London, and at Trinity College, Cambridge. In 1878 he was appointed lecturer at the latter college, in 1891 director of mathematical studies, and in 1898 senior tutor and chairman of the college educational committee. He became auditor of the Cambridge University accounts (1907) and in addition to his other duties served frequently as examiner and as member of boards and syndicates. His writings, besides many papers contributed to mathematical journals, include: *The Genesis and History of Newton's Principia* (1893); *The Student's Guide to the Bar* (7th ed., 1904); *History of Trinity College, Cambridge* (1906); *A History of the First Trinity Boat Club* (1908); *Short Account of the History of Mathematics* (5th ed., 1912); *Mathematical Recreations and Essays* (5th ed., 1912).

**BALLAD** (OE. and OF. *balade*, Fr. *ballade*, dancing song, from Late Lat. and It. *ballare*, to dance, from Gk. *βαλλίζειν*, *ballizein*, to dance; cf. *ball*, *ballet*). A versified narrative, in a simple, popular, and often rude style, of some valorous exploit or some tragic or touching incident. Indeed, so far as subject is concerned, the ballad is a species of minor epic yet with a strong lyric element. It is comparatively short, the story being circumscribed, and not embracing a combination of events, as does the plan of the grand epic. There can be little doubt that the ballad has been the earliest form of poetry among all nations, and that the earlier epics or heroic poems of the higher kind, such as the *Cid* or the *Nibelungenlied*, and, for that matter, the *Iliad* and *Odyssey* of Homer grew out of such simple beginnings. The old ballads were handed down orally and thus underwent constant changes. Accordingly, unlike modern poems, the popular ballad has no individual author, and the treatment of the theme, whether war, crime, love, or enchantment, was thus always objective, there being no poet to thrust forward his own emotions. These ballads make their appeal directly to the common feelings of love, hate, fear, shame, and grief, by means of a great variety of incident. Some of them are humorous, being merely *fabliaux* in ballad measure; some are versions of current romances, but the best of them spring from native tradition. It was long ago observed that the ballads of various nations are frequently based upon the same or similar incidents; and the tracing of the development of these primitive *Märchen*, whether they were carried from people to people by wandering minstrels or are the common inheritance of the Indo-European races, is of more interest and value to the student of folklore than is the study of their form to the historian of poetry. See Gummere, *The Beginnings of Poetry* (New York, 1901).

All the British ballads, in the present form, are of comparatively recent date; the oldest manuscript now existing is assigned to the first quarter of the fifteenth century. But there are allusions to Robin Hood, by Langland, 50 or more years earlier; and, according to Child, this story undoubtedly began to assume a ballad form as early as the thirteenth century. There is no reason, in any case, to doubt that the Anglo-

Saxons had their narrative songs; indeed, Tacitus speaks of certain *carmina* among the Germanic peoples, though none of these have survived independently, being fused in such connected works as *Beowulf* and the *Nibelungenlied*. Of British ballads, those in the Scotch dialect are the best, being much more spirited than those composed in England. This may be accounted for partly by the fact that in the north their traditional form was long preserved, while in the south they got into print early and were thus subjected to a kind of revision which amounted to mutilation. It is difficult to make a selection, owing to the abundance of material, but among the best known are the "Geste of Robin Hood," a series of ballads forming a miniature epic; "The Hunting of the Cheviot," "Sir Patrick Spens," "Mary Hamilton," "The Wife of Usher's Well," "The Twa Corbies," "Clerk Saunders," and "Fair Helen of Kirkconnel Lea." All these old ballads were intended for a musical setting. If short, they were sung; if of considerable length, they were chanted, often by professional minstrels, to the accompaniment of some instrument, as the harp or fiddle. The typical stanza (though subject to variations) consists of two rhyming verses, each having seven accents, divided into lines of four and three accents. Ballads were always popular in England, although after the invention of printing they were not so commonly sung. In the eighteenth century a great revival of interest in the older ballad literature took place, stimulated largely by the publication, in 1765, of Percy's *Reliques of Ancient English Poetry*, derived mainly from a seventeenth century manuscript. Other famous collections followed: Scott's *Border Minstrelsy* (1802–03) and Motherwell's *Minstrelsy, Ancient and Modern* (1827). The influence of Percy's book was very great in both England and Germany. It led to a whole class of imitative ballad literature, of which may be mentioned Bürger's "Lenore," Tennyson's "Revenge," and Rossetti's "King's Tragedy." Such imitators, however, have taken suggestions from rather than held close to the older ballad form and have especially departed from their models in the intrusion of the subjective note of characteristic modern poetry. In fact, the paramount interest of the revival of balladry lies in the fact that it broke up the exclusive domination of the heroic couplet and led to freer versification. American ballads are not wanting; some of them may be found in the collection *Cowboy Songs* (New York, 1911), made by John A. Lomax; important as genuine ballads in the proper sense, and illustrative of the literary laws at work in the production of the ballads of the past the world over. Crude and artless as they are, they justify strict classification as ballads by the impersonality of their authorship, their primitive and robust humanity, and the blend of lyrical and narrative elements.

The oldest extant German ballad of the kind described under this title is the famous *Hildebrandslied* (q.v.), which can be traced to the eighth century and is the only survivor of its period and class. By the middle of the twelfth century the development of German poetry, despite all Romance influences, had definitely won its greatest triumphs in the field of native ballad literature. By 1300 the courtly minnesinger had begun to give place to the *bourgeois* meistersinger; and the latter for two centuries summed up the poetical life of the nation in their ballads. The sixteenth century was a period of rapid decline, as in England; and it was not, as already indicated, until Percy's influence on Herder and Bürger had caused a revival of interest that the ballad again came to the front, and was during the nineteenth century a subject of wide literary interest.

Among the Latin nations the Spaniards possess the richest ballad literature. Here the fact that the ballad preceded the romance is easy of demonstration. The simple emotions of the people are vividly depicted in the *coplas*, *seguidillas*, and *muñeiras* which sprang up in great numbers. The octosyllabic line was the commonest metre, and assonance (q.v.) was used instead of rhyme.

The ballads (*pjesme*) and hero songs (*yunak*) of Servia, while comparatively little known, deserve an important place in any general treatment of the subject. Their history is at least as long as that of the western ballads; and the researches of recent scholars, especially Vuk Stephanovich (1787–1864), and Ljudovik Gaj (1809–72), have succeeded in accumulating in permanent form a vast mass of them which possess the same general characteristics in subject as the other ballads, while as to form the older ones are generally composed in 15 and 16 syllable lines, the modern in decasyllabic metre. As a nation comparatively untouched by modern unifying civilization, the Servians are still producing, or maintaining in popular use, ballads which look upon life from a primitive point of view, which has long been lost in the west.

**Bibliography.** For English and Scottish ballads, Percy, *Folio Manuscript* (3 vols., ed. Hales and Furnivall, London, 1867–68); good preparatory books are Gummere, *Old English Ballads* (Boston, 1894), and *The Popular Ballad* (New York, 1907); the best general work, Child, *English and Scottish Popular Ballads* (5 vols., Boston, 1883–98); the last volume contains an almost exhaustive bibliography. See ENGLISH LITERATURE with the appended bibliography.

For the German, Uhland, *Alte hoch- und niederdeutsche Volkslieder* (4 vols., 3d ed., Leipzig, 1892); Scherer, *Die schonsten deutschen Volkslieder* (Leipzig, 1868); Simrock, *Lieder der Minnesinger* (Elberfeld, 1857); Robertson, *A History of German Literature* (Edinburgh, 1902); Vogt and Koch, *Geschichte der deutscher Litteratur* (2 vols., Leipzig, 1904); and see GERMAN LITERATURE with an appended bibliography.

For the Spanish, Marin, *Cantos populares españoles* (5 vols., Madrid, 1882–83); *Biblioteca de las tradiciones populares* (11 vols., Seville, 1883); Böhl von Faber, *Floresta de rimas antiguas castellanas* (3 vols., Hamburg, 1821–25); Balaguer, *Historia de los Trovadores* (Madrid, 1888); Menendez y Pelayo, *Estudios de Critica Literaria* (Madrid, 1895); Ticknor, *History of Spanish Literature* (4th ed., New York, 1871); Lockhart, *Ancient Spanish Ballads* (London, 1823); and Fitzmaurice Kelly, *A History of Spanish Literature* (New York, 1898).

For the Servian, Bowring, *Servian Popular Poetry* (London, 1827); Kapper, *Volkslieder der Serben* (Leipzig, 1853), and Krauss, *Sagen und Märchen der Südslaven* (Leipzig, 1884). See also SERVIAN LITERATURE.

For the ballad in general, see Gummere, *The Popular Ballad* (New York, 1907); and id., *Democracy and Poetry* (1911).

**BALLAD.** In music the term designated at different periods widely divergent musical forms. The oldest ballads were chiefly literary productions which were recited by minstrels with impro-

vised accompaniment on the harp. This is particularly true of the oldest ballads of England, Scotland, Scandinavia, and Spain, while in Italy the ballad (*ballata*) was a real dance song before the development of instrumental music. Riemann considers it highly probable that in Germany and France during the twelfth and thirteenth centuries these simple dance songs were gradually transformed into more artistic forms. At any rate, during the fifteenth century we find the ballad together with the rondeau (q.v.) the most popular form of artistic song with instrumental accompaniment, especially in Spain. By far the greater number of the 459 compositions contained in the *Cancionero musical de los siglos XV y XVI* are such ballads. In England ballads not only enjoyed the greatest popularity during the sixteenth century, but ballad writing became even a fashionable amusement. After the sixteenth century the form of the ballad became more and more simple, gradually returning to the plain strophic folk song. Its decline was particularly rapid in England, where about 1800 the term denoted a cheap, trivial song whistled in the streets.

The modern ballad is not a revival of the older form. Zumsteeg (q.v.) was the first to furnish a musical setting for the splendid literary ballads of Goethe, Schiller, and Bürger, and naturally the musical form (scarcely more than the same strophic melody for all stanzas) was very primitive and inadequate. Löwe (q.v.), whose fame rests entirely upon his ballads, strove for characteristic expression of each stanza and secured artistic unity by means of a few pregnant motives, which appear constantly in thematic development. Schubert, Schumann, and Brahms, adopting Löwe's principle, have furnished unsurpassed examples of the modern vocal ballad. Schumann also set several of Uhland's ballads for soli, chorus, and orchestra. Senta's ballad from *The Flying Dutchman* is perhaps the most widely known example of this form. In modern music, especially since Chopin wrote his superb *Ballades*, the term appears frequently as a title of purely instrumental works for piano or orchestra. Such works have the same thematic structure as the vocal ballad, but their fundamental mood is usually that of the more sinister emotions. For the older ballads consult H. Riemann, *Handbuch der Musikgeschichte*, vol. ii, part i (Leipzig, 1906).

**BALLADE**, bȧ'lȧd' (Fr.; see BALLAD). A poem which consists of three stanzas of eight lines, followed by one of four lines (known as the "envoy"), or three of 10 lines with envoy of five, each of the stanzas and the envoy closing with the same refrain. In the ballade of eight lines there are but three rhymes, in this order: *A, B, A, B, B, C, B, C;* the envoy repeats the last four. The envoy is a special feature of the ballade and chant royal; it was usually a form of dedication to a noble patron, so that even in modern ballades it generally begins with a vocative, as "Prince!" "Princess!" or the like. The chant royal is merely an enlarged ballade, with five stanzas of 11 lines and envoy of five. While poems of undecided structure, called rondeaux, and ballades began to make their appearance at the end of the twelfth century, the ballade, as a strict metrical form, is really due to François Villon (q.v.) and Charles of Orléans. Théodore de Banville (q.v.) revived this and other early French forms about 1860, and they have since been successfully imitated in English by Swinburne, Andrew Lang, Austin Dobson, Edmund Gosse, W. E. Henley, Frank Dempster Sherman, and others.

**BALLADINO**, bäl'lȧ-dē'nō, ANTONIO. A versifier in Ben Jonson's *The Case is Altered*, whose motto is: "Tut, give me the penny; I care not for the gentlemen, I." Munday, a contemporary dramatist, is satirized.

**BALLAD-OPERA.** A kind of operetta which was the rage in England during the eighteenth century. Instead of writing music to the words, the process was reversed. A number of well-known popular airs were strung together and new words were written to the music. These airs were interspersed in spoken dialogue. The first and most popular of these ballad operas was John Gay's (q.v.) *Beggar's Opera*, produced in London in 1727. It was followed in the next year by six similar works by different authors. In 1750 the *Beggar's Opera* made its appearance in New York, and for three-quarters of a century works of this kind were the only operatic fare offered to the American public. Consult G. Sarrazin, *John Gay's Singspiele* (Weimar, 1898).

**BALLAGI**, bŏl'lŏ-gē, MÓR (MORITZ), originally **BLOCH**, blŏK (1815–91). A Hungarian philologist and theological author, born at Inócz, of Jewish parentage. After completing his studies at Budapest and Paris he undertook a translation of the Bible into Hungarian, for the purpose of Magyarizing the Jews. Of this work, only the Pentateuch and the Book of Joshua were published (Budapest, 1840–43). In 1840 he was made a member of the Hungarian Academy. He became a Protestant in 1843 and thereafter studied theology at Tübingen. From 1855 to 1878 he was professor of theology at Budapest. His philological works include: *Ausfuhrliche theoretischpraktische Grammatik der ungarischen Sprache* (1843; 8th ed., 1881); *Vollständiges Wörterbuch der ungarischen und deutschen Sprache* (2 vols., 1854–57; 6th ed., 1890); *Magyar példabeszedek Közmondások* ('Collection of Hungarian Proverbs') (2 vols., 1850; 2d ed., 1855).

**BALLANCHE**, bȧ'länsh', PIERRE SIMON (1776–1847). A French writer on social theories. Among his works may be mentioned: *Antigone* (1814); *Essai sur les institutions sociales dans leurs rapports avec les idées nouvelles* (1818); *Le vieillard et le jeune homme* (1819); *L'homme sans nom*—a novel (1820); *Palingénésie sociale* (never completed), and *La vision d'Hêbal* (1832). The *Palingénésie*, which he did not finish, was to be an exposition of the workings of God in history and is considered his greatest work. His system, termed "Ballanchism," attracted much attention. Ballanche was a member of the circle gathered around Châteaubriand and Madame Récamier, his platonic affection for the latter forming part of the literary history of his period.

**BALLANTYNE**, JAMES (1772–1833). A Scottish printer, born at Kelso. He studied at Edinburgh University and in 1796 became proprietor and editor of the *Kelso Mail*. He published Sir Walter Scott's *Minstrelsy of the Scottish Border*, and in 1802, at Scott's advice, set up a printing establishment at Edinburgh. In 1808 he also became a member of the firm of John Ballantyne & Co., booksellers, and from 1817 he edited the *Weekly Journal*. Not only did he read the proofs of Scott's works for technical details, but oftentimes he proffered criticisms which, as Lockhart testifies, led Sir Walter to introduce important changes into the

treatment of a subject. Although not himself responsible for the financial difficulties of Scott, he was involved in the failure of Constable & Co. and subsequently was retained by the trustees of the creditors to conduct the literary affairs of the printing establishment and to edit the *Weekly Journal*.

**BALLANTYNE**, JAMES ROBERT (1813–64). A British Orientalist, born at Kelso, Scotland, and educated at Haileybury College, Herts, England. He was at first instructor at the Scottish Naval and Military Academy, but was sent to India in 1845 to take charge of the Government Sanskrit College at Benares, with which institution, after 1856, he was also connected as professor of moral philosophy. Upon his return to Europe he was appointed librarian of the East India Office. His primary aim, as embodied in his works, was the elucidation of Oriental ideas in such a way as to show their relation to European science. His works include: *The Practical Oriental Interpreter* (1843); *Catechism of Sanskrit Grammar* (2d ed., 1845); *A Synopsis of Science in Sanskrit and English Reconciled with the Truths to be Found in the Nyaya Philosophy* (1856)— a work of genuine scientific merit; *Christianity Contrasted with Hindu Philosophy* (1859).

**BALLANTYNE**, ROBERT MICHAEL (1825–94). A Scottish author, born at Edinburgh, a nephew of James Ballantyne. In 1841–47 he was in the service of the Hudson's Bay Fur Company in Rupert Land and in 1848 published an account of his experiences as, *Hudson's Bay; or, Life in the Wilds of North America*. From 1856, in his own words, he "lived by making storybooks for young folks." Of these he wrote with much success more than 80, including *Young Fur Traders* (1856), *Coral Island* (1857), *The Gorilla Hunters* (1862), *Black Ivory* (1873).

**BAL'ARAT'**. The most important commercial centre, next to Melbourne, in Victoria, Australia (Map: Victoria, C 5). It consists of the two municipalities of Ballarat West and Ballarat East, situated in one of the richest of Australian gold fields, on the west and east banks of the Yarrow River. It is 74 miles northwest of Melbourne and is the centre for six branch railroads. Its chief industries are those of the gold mines, iron foundries, woolen and flour mills, breweries, and distilleries. It is the see of Anglican and Catholic bishops, has many handsome buildings, churches, hospitals, monuments, Botanical Gardens, an excellent School of Mines, etc. Its establishment and rise date from the discovery of gold in 1851. The largest gold nuggets ever unearthed were discovered here. Ballarat East and Ballarat West have been distinct municipalities since 1855, and in 1870 the latter was proclaimed a city. Pop., 1911, 42,403.

**BAL'LARD**. Formerly a city in King Co., Wash. It has a good harbor and is one of the most important lumber manufacturing centres in the United States. Other leading industries are the manufacture of foundry and machine-shop products and shipbuilding. Ballard was settled in 1882 and was incorporated in 1890. In 1907 the towns of Ballard, Columbia, and portions of other precincts were joined to Seattle and now form a part of that city.

**BALLARI**. See BELLARY.

**BAL'LAST** (first part of uncertain origin; perhaps Eng. *bare*, mere + *last*, burden, weight). Weight carried by a ship or boat to secure proper stability, both to avoid risk of capsizing and to secure the greatest effectiveness of the propelling power. Modern steamers have tanks fitted for water ballast and rarely carry any other kind. The tanks are located forward, aft, and amidships, in order that the vessel may not only be immersed to a safe extent, to avoid danger of capsizing, but also so that the trim, or inclination of the keel to the surface of the water, may be adjusted. When light (i.e., with little or no cargo), steamers require *trimming* by the stern (i.e., to have the stern more deeply immersed than usual), in order to submerge the screw or screws. Sailing vessels require greater stiffness (i.e., power to resist capsizing) than steamers, in order to stand up under the force of wind against their sails as well as to resist the motion imparted by the waves. The amount of ballast needed depends not only upon the depth of immersion, but upon the shape of the hull, some forms of which require more ballast than others. In ballasting or stowing cargo, the ballast and cargo are considered together, the quantity and distribution of the former being dependent on the latter. The combined effect of both should not place the centre of gravity too low or too high. If too low, the ship will be unduly *stiff* and will roll violently and jerkily, though perhaps not deeply; and she will sail sluggishly, except in a comparatively smooth sea. If the centre of gravity is too high, the vessel will be *crank*, and will be dangerous from lack of power to right herself when heeled over by the wind pressing on her sails or by the action of the waves; she may roll deeply, but her rolls will be slow; crankness interferes with speed under sail, because it reduces the amount of sail which can be safely carried; furthermore, the lack of righting power, or stability, which causes crankness, prevents the vessel from responding quickly to the action of the waves. A vessel is said to be *in ballast* when she has ballast only on board.

The term is applied to bags of sand used to steady or lighten a balloon. Civil engineers use the term "ballast" to signify the sand or gravelly material which is laid as a foundation for roads, concrete floors, etc., or as packing between railway sleepers, in order to give them solidity. No modern railway is considered to be complete or safe for transit until it is dressed and finished by ballasting. The possibility of procuring ballast at a cheap rate considerably affects the course of railway undertakings.

**BALLAST PLANTS.** Plants growing on or distributed from the ballast of ships, from seeds which were contained in the ballast when loaded on the vessel, or which have fallen on it in transit. Various kinds of plants have thus been transported from one region to another. Botanists have made a special study of ballast plants in relation to the general subject of the transportation of plants by different agencies.

**BALLASTER**. See BALUSTER.

**BAL'LATER** (Gael. *baile*, town + *leiter*, slope of a hill). A village and police burgh of Aberdeenshire, Scotland, on the Dee, 43 miles by rail west-southwest of Aberdeen (Map: Scotland, E 2). It is frequented on account of the medicinal springs in the neighborhood. Pop., 1911, 1240.

**BALL BEARING**. See BEARING.

**BALL CLAY**. See CLAY.

**BALLENDEN**, JOHN. See BELLENDEN.

**BALLENSTEDT**, bäl'len-stĕt. A town in the German duchy of Anhalt, situated in the Harz

Mountains, about 7 miles by rail from Quedlinburg. It is celebrated chiefly for its castle, the summer residence of the dukes of Anhalt-Bernburg. From the tenth to the sixteenth century this castle was a Benedictine monastery. It is the seat of a district court, has a fine park, an extensive library, and a number of valuable collections. Pop., 1900, 5423; 1910, 6100.

**BALLENTYNE,** JOHN. See BELLENDEN.

**BALLENY** (bål-lā'nē) **ISLANDS.** A group of islands in the Antarctic Ocean in lat. 67° S., and long. 163° E., 280 miles north of Victoria Land (Map: Antarctic Region, F 6). It consists of three large and two small islands, of volcanic origin, and covered with glaciers. Freeman's Peak, on Young Island, is about 12,000 feet high. The group was discovered by John Balleny in 1839, and at the time two of the volcanoes were in eruption.

**BALLESTEROS,** bäl'yā-stā'rōs, DON FRANCISCO (1770–1832). A Spanish general and statesman, born at Saragossa. He entered the army and served with distinction against the French. When the Duke of Wellington was appointed to the chief command of the allied armies, Ballesteros resigned, refusing to serve under a foreigner, in consequence of which he was banished to Ceuta. Upon the restoration of Ferdinand VII Ballesteros received the command of an army corps and became Minister of War in 1815. Appointed Vice President of the Provisional Government by Ferdinand VII, he opened the prisons of the Inquisition, returned to the municipality of Madrid the rights granted by the Cortes in 1812, and at the head of the national militia dispersed the enemies of the constitution. In the war against France (1823) he was compelled to retreat and to agree to terms of peace so humiliating, and in the eyes of the Spaniards so disgraceful and unwarranted, that he has always been considered a traitor. Excluded from the general amnesty, he was forced, upon the downfall of the constitutional government, to flee to Paris (1824), where he lived in retirement until his death.

**BALLESTREM,** bäl'les-strâm, FRANZ XAVER, COUNT VON (1834–1910). A German statesman. He was born on the family estate of Plawniowitz in upper Silesia, entered the Prussian army, served in the campaigns of 1866 and 1870–71 and at the close of the latter retired with the rank of captain. He was elected to the Reichstag in 1872 and took a prominent position in the Centre Party, being appointed a papal chamberlain by Pius IX for his vigorous services in the Culturkampf. He was First Vice President of the Reichstag in 1890–93 and President from 1898 to 1906. In 1903 he became a member of the Prussian House of Lords.

**BALLET,** bäl'lā' *or* bäl'lĕt (Fr. dimin. of *bal,* dance, It. *ballo,* ball, dance, from Late Lat. and It. *ballare,* to dance; cognate with "ballad.") A species of dance in which a company of trained performers, either singly or in groups, interpret music by means of the choregraphic art. Owing to its resemblanee to the chorus of the classic Greek tragedy, attempts have been made to trace its history back to the pantomimic, sacrificial dances of antiquity. The earliest ballet performance of which we have record was in Milan, at the wedding of the Duke of Milan to Isabel of Aragon in 1489. The home of our modern ballet was undoubtedly Italy, where it was first employed as a court spectacle. In its infancy song and recitation were introduced with the music and dancing which we know at present.

From Italy the ballet was carried to the French court in the time of Catherine d' Medici. In 1581 Baltasarini (called Beau Joyeux), Catherine's director of music, presented the famous *Ballet Comique de la Reine,* and the new entertainment soon proved so popular that royalty itself took part in the performances. With the growth of court luxury under Louis XIII and Louis XIV, the *ballets-de-cour* were more elaborately staged and became a favorite diversion. Both monarchs are said to have taken part in them when young. One of the most famous court ballets at this time was the *Triomphe d'Amour,* produced by Quinault, Benserade, and Lulli in 1681. It was in this same year that women first took parts, the entire cast having previously been of men. During the reign of Louis XIV the ballet was first placed on the popular stage.

In 1758 appeared the publication of Jean Noverre's *Lettres sur le danse et les ballets,* which revolutionized its form. Noverre contended that the ballet was a blending of the arts and was to be used primarily for the interpretation of a story and not for the display of virtuosity. He attempted to abolish words from the ballet and substitute pantomime; from his time dates the *ballet d'action* and the abolishment of pure formalism in the dance. He was appointed dancing master of the ballet at the Paris Opera by Marie Antoinette and continued his activity until the French Revolution.

During the period of the upheaval in France there is no record of the ballet, but in the first half of the nineteenth century we have the heyday of the French and Italian schools. Gaetan Vestris and his son Auguste appeared about 1810; the former was reputed to be the most graceful male dancer that ever trod the stage. In 1822 Marie Taglioni set Paris aflame by her *La Sylphide;* shortly afterward her rival, Fanny Ellsler, eclipsed her fame in *Le Diable Boiteux;* Carlotta Grisi, the ethereal, gained her reputation in *Giselle,* a ballet composed specially for her by the author, Théophile Gautier; Fanny Cerito, and Lucile Grahn also belong to this period. The high-water mark of this type of ballet came in 1845, when four of the greatest danseuses—Taglioni, Grisi, Cerito, and Grahn—appeared in London in the famous ballet *Pas de Quatre.* This was regarded as an international event of first importance. Within six years of that date this entire school had disappeared, and but one name stands out in the third quarter of the century, Rosati, who was decidedly second-rate compared to her predecessors.

The ballet as a separate performance then disappeared in favor of skirt dancing and high kicking, save when given as an interlude to the opera (cf. FAUST). In the last quarter of the century, however, the school of the Russian ballet began to appear as the successor of the French and Italian.

The first movement in Russia toward the formation of a ballet was when Czar Alexius in 1672 ordered Johan Gregory to collect performers of the dance. In the reign of Czarina Anne (1730–1740) C. Friedrich Wellman was ordered to secure recruits for the public entertainments, and twelve ballet masters were appointed. This was the beginning of the school

of St. Petersburg. Following sovereigns encouraged its growth until the beginning of the nineteenth century, when Didelot, the great ballet master, appeared to do the same thing for the Russian ballet that Noverre had done in France. He formulated principles and exact methods of instruction and induced all the great dancers, such as Taglioni and Ellsler, to appear in St. Petersburg. When in 1850 French and Italian dancers no longer shone on the stages of western Europe, the Russians continued quietly and inconspicuously to preserve the traditions in their own country, and gradually, under Petipas and Fokine, the present Russian school evolved. It is unlike any previous school, uniting with the formal romanticism of the old-time ballet fairy lore an intensely modern realism. For the first time in the history of the ballet, under M. Bakst, the Russian painter, is emphasised the importance of proper blending of color and mass in the entire *mise-en-scène*. This school produced Anna Pavlowa, pronounced the equal of Taglioni and Ellsler.

Consult: Menestrier, *Des ballets anciens et modernes* (Paris, 1682); Noverre, *Lettres sur la danse et les ballets* (Lyons, 1760; new ed., Paris, 1807); Castil-Blaze, *La danse et les ballets* (Paris, 1832); Voss, *Der Tanz und seine Geschichte* (Berlin, 1868); A. Pougin, *Dictionnaire historique du théâtre* (Paris, 1885); Flitch, *Modern Dancers and Dancing* (London, 1912).

**BALL'-FLOW'ER.** A detail of ornament in English Gothic architecture, so named from its resemblance to a ball within a flower, usually with three, sometimes with four, petals. The ball-flower is supposed by some to be an imitation of a pomegranate.

**BALLIN,** Hugo (1879– ). An American figure and decorative painter. He was born in New York City; studied at the Art Students' League, where he won a scholarship, and later (1900–03) in Italy. During this time he had the advantage of studying mural decorations in Lombardy and Umbria with Robert Blum. He returned to this country to reside and practice in New York. Among his chief paintings are "Susanna's Bath"; the "Lute Player"; "Three Women Dancing about Cupid," which won the Shaw Prize in 1905 (the year in which he became an Associate of the National Academy); "Mother and Child" (Clarke Prize, 1906); "The Portative Organ," an excellent example of his style. Because of his notable ability in the field of decorative painting, Ballin became known as one of the most promising of the younger American artists. He excels especially in color, which is always soft and in a low key, and his work is elusive in line and excellent in composition. His art, more than that of any other contemporary American painter, recalls the harmonies of the masters of the Italian Renaissance.

**BALLINA,** băl'ĭ-nă' (shortened from Gael. *Bel-an-atha-an-feadha,* the ford south of the wood, from *bel,* estuary + *ath,* ford). A seaport in the counties of Mayo and Sligo, Ireland, on the Moy, 7 miles south of its entrance into Killala Bay (Map: Ireland, B 2). The Moy runs through the town, is crossed by two bridges, and separates the two counties. Ballina proper is on the Mayo side, the Sligo portion being called Ardnaree. The river is navigable from the sea to a mile and a half below the town. Ballina has a brisk trade in agricultural produce, in salmon, and in cured provisions. Flour, beer, coarse linens, and snuff are manufactured. The river Moy and Lough Conn are favorite angling resorts. Killala Bay was the rendezvous of the French invaders in 1798. They landed and took Ballina, but three weeks afterward were defeated at Killala. Pop., 1901, 4505; 1911, 4662.

**BALLINGER,** băl'ĭn-jĕr. A city and the county-seat of Runnels Co., Tex., 225 miles west of Fort Worth, on the Colorado River, and on the Abilene and Southern and the Gulf, Colorado, and Santa Fe railroads (Map: Texas, C 4). The city contains a Carnegie library, two theatres, three parks, and a lake, and owns its water works. It is situated in a rich agricultural region, producing corn, cotton, wheat, peanuts, fruit, etc., and has a flour and a cotton-seed-oil mill. An enormous irrigating plant on the Colorado River is in the course of construction. Pop., 1900, 1128; 1910, 3536.

**BALLINGER,** Richard Achilles (1858–1922). An American lawyer and public official. He was born in Boonesboro, Iowa, graduated from Williams College in 1884 and was admitted to the bar two years later. Until 1897 he practiced, successively, in Kankakee, Ill., New Decatur, Ala., and Port Townsend, Wash. In 1890–92 he was a United States court commissioner and in 1894–97 a judge of the Superior Court of Jefferson Co., Wash. Immediately after this he took up the practice of law in Seattle, of which city he was mayor from 1904 to 1906. Following two years as commissioner of the General Land Office, he was chosen by President Taft Secretary of the Interior (1909). His opposition to a radical programme for the conservation of public resources brought him into bitter conflict with Gifford Pinchot, the chief forester. Finally a congressional inquiry was made into the methods employed by Mr. Ballinger in administering certain Alaska coal lands belonging to the government. (See Alaska, *Public Lands;* and United States, *History.*) Upheld throughout by the President, the Secretary was not permitted to resign until he had been exonerated by the investigating committee. Early in 1911 he returned to the private practice of law in Seattle. His published writings include *Ballinger on Community Property* (1895) and *Ballinger's Annotated Codes and Statutes of Washington* (1897).

**BALLIOL** (bāl'yol) **COLLEGE.** One of the largest and most important colleges in the University of Oxford. Its original foundation is attributed to Sir John de Baliol of Barnard Castle, Durham (father of the Baliol who contested the crown of Scotland with Bruce), as an act of penance for injuries done to the churches of his neighborhood. Its first scholars were in residence between 1260 and 1266 in a hired house; but while Balliol may claim, on the ground of the longest occupation of the same site and of priority in the benefaction to which it owes its inception, to be the oldest of the Oxford colleges, it was not, until 20 years later, a college in the modern sense of the word; it was originally, like the colleges of Paris at the same time, simply an association of students presided over by a principal of their own election, and did not become an endowed corporation with a permanent home until, in 1282, Devorguilla, wife of John de Baliol, completed the scheme and gave the college its first statutes. It was long comparatively unimportant. Although Wiclif became its master about 1360,

it was for a while the home of the champions of the scholastic philosophy. In the fifteenth century it became "the nursing mother of the early English humanists," such men as Humphrey, Duke of Gloucester, and John Tiptoft, Earl of Worcester, being numbered among its scholars. After this period of brilliance Balliol was little heard of until the nineteenth century, when it came once more to the front. It was blessed with a succession of able masters, of whom the most famous was Benjamin Jowett; it received many notable benefactions, particularly the Snell Exhibitions, which have attracted many brilliant Scotchmen, among them Adam Smith, Sir William Hamilton, and J. G. Lockhart; and, at the same time that it set the example (with Oriel) of opening its scholarships to general competition, it established a rigid standard of ability for its members, by requiring from them an additional entrance examination and obliging them to read for honors in the schools. The college consists of a master, 26 fellows and honorary fellows, about 50 scholars and exhibitioners, and in 1912 had 262 undergraduates. Its buildings date from the library, part of which is as old as 1430, to the present hall, completed in 1877. It has a long list of distinguished graduates, particularly in the nineteenth century. Among poets and men of letters it can boast of Southey, Matthew Arnold, Swinburne, Clough, Andrew Lang, and Calverley, besides having associated to itself Robert Browning as an honorary fellow. To the Oxford Movement it contributed Cardinal Manning and William George Ward; and to the English Church two of its primates, Tait and Temple. And more than one of the intellectual and social movements specially characteristic of the end of the nineteenth century owe their inspiration to T. H. Green, fellow of Balliol from 1860 and afterward professor of moral philosophy, while many of the leading politicians of the present time are graduates of Balliol. Consult H. W. C. Davis, *Balliol College* (London, 1899).

**BALLIS'TA.** See ARTILLERY.

**BALLIS'TIC PEN'DULUM.** See BALLISTICS.

**BALLIS'TICS** (*Ballista*, an engine for hurling missiles—Lat. from Gk. *βάλλειν*, *ballein*, to throw). The science which treats of the motion of heavy bodies projected into space. Its usual meaning is, however, restricted to the motion of projectiles of regular form, fired from cannon or small arms.

The motion of a projectile, from the instant it starts from its seat at the bottom of the bore of a gun until it strikes the object aimed at and comes to rest, passes through three distinct and discontinuous phases which necessarily give rise to as many different branches of the science of ballistics. These are called, respectively, *interior ballistics*, which treats of the motion and cause of motion of a projectile while in the gun; *exterior ballistics*, which considers the motion of the projectile from the time it emerges from the gun with a known velocity of translation and of rotation until it strikes the object aimed at; and *ballistics of penetration*, which has reference to the effect of the projectile upon the target. This is not the order in which the three phases of the subject are usually presented to the artillerist, but the reverse. He desires to penetrate or destroy a certain object, say the side of an armored ship. Ballistics of penetration enables him to determine the velocity his projectile must have on impact and the proper striking angle to accomplish the desired result. Exterior ballistics would then carry the data thus obtained to the gun and determine the necessary muzzle velocity and angle of projection. Lastly, interior ballistics would ascertain the proper charge, kind of powder, size, shape and density of the grains to give the projectile the muzzle velocity demanded without unduly straining the gun.

These three divisions will be considered separately in the order first named.

### INTERIOR BALLISTICS

Interior ballistics treats of the temperature, volume, and pressure of the gases into which the powder charge in the chamber of a gun is converted by combustion, and the work performed by the expansion of these gases upon the gun, carriage, and projectile. It determines among other things the proper relation of weight of charge to weight of projectile and length of bore, the best size, shape, and density of the powder grains for different guns and their effect upon the maximum and muzzle pressures. It deduces formulas for determining the pressures upon the surface of the bore for different charges, sizes, and shapes of grains, and thus shows how to build up the gun so as best to resist these pressures.

**Early History.** It is only within the last 50 years that the complicated phenomena which take place in the bore of a gun when the charge is fired have been clearly apprehended. The celebrated Benjamin Robins (1740) made many experiments relating to interior ballistics. His deductions from his experiments, in spite of the extremely erroneous and sometimes absurd opinions on the subject that were entertained in those days, justly entitle Robins to be called the "father of modern gunnery." Dr. Hutton's experiments verify most of Robins's deductions, differing principally in the estimate of maximum temperature and pressure. Count Rumford (1792) made the first attempt to measure directly the pressure of fired gunpowder. The account of his experiments was the most important contribution to interior ballistics which had been made up to that time.

**Recent History.** In the study of interior ballistics the gun may be regarded as a thermodynamic machine or heat engine, which does its work in one stroke, in contradistinction to the steam engine, which works through a series of strokes. And, just as with the steam engine, an indicator diagram may be drawn for the gun representing graphically by a curve the relation between the pressure of the powder gas and the distance traveled by the projectile, which distance measures the volume occupied by the gas. Thus in Fig. 1, if *OB* represents the axis of the bore, the pressures may be shown under different conditions by the indicator curves *Pab*, *OP'P''ab*, and *OP'P'''b*. If the exact form of either of these pressure curves were known, it would be easy to determine the velocity of the shot (very nearly) at any travel *OB* down the bore. For, as with all indicator diagrams, the area *OP'P'''bB*, bounded by the curve of pressures, the axis of $x$ (axis of the bore of the gun), the ordinate *OP'* through the origin of motion, and any other ordinate *O''P'''*

or *Bb* drawn through the base of the projectile at any travel *OO''* or *OB* measures the work done by the expansion of the gas, which, if we omit

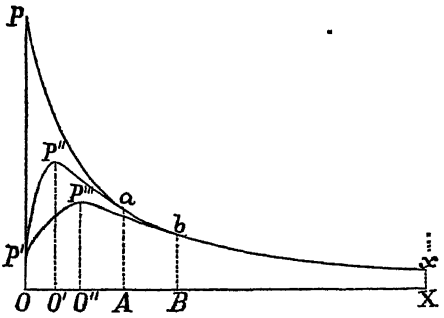



FIG. 1.—PRESSURE CURVE.

*O P*, axis of pressures; *O X*, axis of bore of cannon; *OP'*, pressure if the charge burned instantaneously; *OP'P'' a b x*, curve of quick-burning powder; *OP'P''' b x*, curve of slow-burning or cocoa powder.

a certain percentage for friction, recoil of the gun, loss of heat by conduction, etc., may be equated to the kinetic energy of the projectile. This gives the fundamental equation of work:

$$\text{Work of expansion} = \frac{wv^2}{2g}\left(1+\frac{1}{2}\left(\frac{\pi}{n}\right)^2\right)$$

in which $w$ is the weight of the projectile, $g$ the acceleration of gravity, $v$ its velocity, and $n$, which measures the twist of rifling, is the number of calibres the projectile advances while making one revolution about its axis. In our army guns, which have an increasing twist, $n$ varies continuously from 50 at the beginning of rifling to 25 near the muzzle. The numerical value of the term containing $n$, which represents the projectile's energy of rotation at the muzzle where it is greatest, is 0.008; and as this is small in comparison with unity, which represents the projectile's energy of translation, it is usual also to omit this in establishing the equations of interior ballistics and to regard the entire work of expansion as measured by the energy of translation of the shot. We therefore have approximately,

$$\text{Work of expansion} = \frac{wv^2}{2g}. \qquad (1)$$

This of course is not a true equation, since the first term is greater than the second on account of the energies omitted; but it can be made true by suitably increasing the weight of the projectile in the second member, or better still, by diminishing the value of a factor, called the "force of the powder," which enters into the first member. And this last is what is actually done in deducing equations for velocity and pressure from the above fundamental equation of work.

Formerly, before the laws of thermodynamics were known, the law of pressures was sought by measuring the velocity of the shot at various travels in the bore and drawing a space-velocity curve to suitable scales, taking the measured velocities for ordinates and the corresponding travels of the projectile for abscissas. By means of this curve a pressure, or indicator curve, may be drawn, and from this an empirical law of pressures deduced. If the velocities could be measured with great accuracy and at numerous points in the bore, especially in the neighborhood of greatest pressure or acceleration, pressure curves could be laid down with great precision, as will be shown later. But the pressure curve thus determined cannot be relied upon beyond the experimental limits upon which it was based.

The first experimenter who made use of this method was the Chevalier D'Arcy, in 1760, who measured the velocity of a bullet at the muzzle of a musket with a ballistic pendulum, after the barrel had been successively shortened by cutting off a portion. This method has been repeated in modern times and the muzzle velocities measured much more accurately than was possible in D'Arcy's time. In 1891 Laurence V. Benét, director of the Hotchkiss Ordnance Company, Paris, experimented with a Hotchkiss 57 mm. rapid-firing gun by "cutting off successive lengths from the chase and observing the velocities of a series of rounds fired, with each resulting travel of projectile." In 1903 similar experiments were made at the Springfield Armory with a rifle the barrel of which was successively shortened 20 times by cutting off one inch at a time. About the same time experiments were made in France with a 16 cm. rifle specially prepared so that the chase "could be *increased* in length by the addition of either one or two tubes at pleasure so as to give three measured muzzle velocities corresponding to three different travels of projectile." (Consult *Mémorial de l'Artillerie de la Marine*, vols. xxi, xxii, and *Journal of the United States Artillery*, vols. xx, xxvi.) In 1845 General Cavalli experimented with a 16 cm. gun by drilling small holes perpendicular to the axis at different distances from the base, into which were screwed wrought-iron barrels from which bullets were propelled by the charge of the gun, while at the same time giving motion to the projectile. The velocities of these bullets were measured, from which the corresponding pressures were inferred. These pressures were much too great on account of the energy with which the products of combustion impinged against the bullets. In 1854 a Prussian Artillery Committee, whose president was General Neumann, experimented with a gun of small calibre by drilling a hole into the powder chamber in which was fitted a small barrel. If cylindrical projectiles of the same length and made of the same material were placed in the gun and in the small barrel, then, on the supposition that the pressure in the powder chamber was uniform, the two cylinders would describe equal spaces in equal times, since the pressures on the bases divided by the respective weights of the projectiles give the same quotient. Therefore, if the velocity of the *cylinder* were measured when it emerged from the small barrel, the velocity of the *projectile* when it had moved the same distance down the bore would be known. These experiments were much more satisfactory than those of General Cavalli, and the conclusions of the committee were subsequently confirmed by the Russian General Mayenski in 1867, who measured the velocity of a projectile at different positions in the bore by a method of his own invention. "He used a projectile to the base of which was attached a rod passing through the breech of the gun and arranged so as to rupture electric currents

placed at varying distances along the path of this rod."

Between the years 1857 and 1859 Maj. T. J. Rodman of the United States Ordnance Department carried out an extensive series of experiments with smoothbore guns of 7-inch, 9-inch, and 11-inch calibres for the purpose of measuring directly the pressure of the powder gas at various points along the bore. His method was to bore at these points channels to the interior of the gun, into which he inserted a very ingenious apparatus for measuring the pressure of the gas invented by himself, and which he called the "indenting" or "cutter gauge." A modification of this apparatus designed to remove certain difficulties inherent in the cutter gauge is now used by all nations and is known as the "crusher" or "pressure" gauge. This gauge consists of a housing *H* (Fig. 2), in which are assembled a steel piston *P* and a copper cylinder *C*, which is centred and kept in place between the piston and the closing plug *J* by the spring *S*. A small copper cup *c*, called an "obturating cup," prevents the entrance of gas past the piston. When the gun is fired, the gas pressure against the piston is transmitted to the copper cylinder, which is thereby permanently shortened or compressed by an amount varying with the pressure. The amount of compression is measured by an instrument called the "micrometer caliper," which is capable of measuring the ten-thousandth part of an inch; and from this measured compression the pressure per square inch that produced it is taken from an experimental table of compressions called a "*tarage* table." Major Rodman's estimates of the pressure of the powder gas are too great on account of the necessity of placing the gauge on the exterior of the gun. Major Rodman was the first to demonstrate by actual experiment that the maximum pressure can be greatly diminished by increasing the size of the powder grain. He also invented a perforated grain which burns with an increasing surface of combustion and thereby tends to equalize the pressure in the bore. The principle involved in this invention is of very great importance in gunnery and has been extensively utilized.

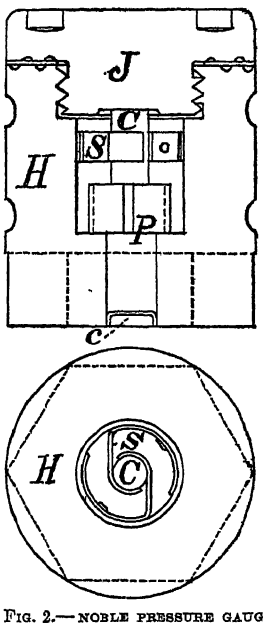



FIG. 2.—NOBLE PRESSURE GAUGE. *P*, piston; *H*, housing; *S*, spring; *C*, cylinder; *J*, closing plug.

About 1862 Capt. Andrew Noble, formerly of the Royal Artillery, but then connected with the Elswick works at Newcastle-on-Tyne, invented a chronoscope for measuring exceedingly small intervals of time, which he soon after applied to the "measurement of the times at which a projectile passed certain points in the bore of a gun." From these measured times he deduced the velocity of the shot from its seat to the muzzle, and then determined in the usual way by calculation the corresponding pressures. (Consult *Phil. Trans.*, 1875, part i, pp. 107–108.) "The mechanical part of the instrument consists of as many thin disks, 36 inches in circumference, as there are points where velocities are to be measured, all keyed on to a single shaft and made to rotate at a very high and uniform velocity through a train of wheels by means of a very heavy descending weight. A stop-clock connected with an intermediate shaft gives the precise speed of the circumference of the disks which is usually arranged at about 1250 inches per second.

"The recording arrangement is as follows: Each disk is furnished with an induction coil, the primary wire from which is conveyed to a plug inserted in the gun at a point where we may wish to record the instant at which the shot passes. There is at each point a special contrivance by which the shot in passing severs the primary wire, thereby causing a discharge from the secondary, which is connected with a discharger near the edge of the disk. The spark records itself on the disk by means of paper specially prepared to receive it. The instrument is capable of recording the millionth part of a second, and when in good working order the probable error of a single observation should not exceed 4 or 5 one-millionths of a second." This latter statement may be a little oversanguine; but it is admitted by a competent judge to be "practically correct to a hundred-thousandth of a second."

The data employed by Noble and Abel in their discussion of the phenomena attending the combustion of gunpowder in cannon were derived chiefly from the experiments carried on by the Committee of Explosives whose president was Colonel Younghusband, F.R.S., using the Noble chronoscope above described (*Phil. Trans.* for 1875). Experiments were made by the committee with the 10-inch, muzzle-loading, 18-ton rifle, loaded with 70 pounds of pebble powder (gunpowder) and a 300-pound projectile. See under *Exterior Ballistics*.

*Theoretical Determination of Velocity.*—The work done by the adiabatic expansion of $y$ pounds of powder gas at the initial temperature of combustion, in the bore of a gun, is given by the equation

$$\text{Work of expansion} = fny\left\{1 - \frac{1}{(1+x)^{\frac{1}{n}}}\right\} \qquad (2)$$

in which $n$ is a simple function of the specific heats of the gas, $f$ is the pressure of unit weight of the gas at temperature of combustion, per unit of surface, and $x$ is a number which varies directly with the travel of the projectile and represents, approximately, the number of volumes of expansion of the gas. If we assume that the work of expansion is measured by the energy of translation of the projectile, we get from equations (1) and (2) the following expression for the square of the velocity:

$$v^2 = \frac{2gfny}{w} X_2, \qquad (3)$$

in which $X_2$ stands for the quantity within the braces of (2). If the charge of powder in the chamber of a gun were converted into gas be-

fore the projectile had time to move, (3) would give the velocity of the shot at any travel with great accuracy. This was practically the case with the old-time fine-grained powder, which was consumed almost instantaneously. But for the modern large-grained powders, which require an appreciable time for burning, the equation does not apply, at least not while the grains are burning. The dimensions of modern powder grains vary with the calibres of the guns for which they are designed. For example, the grains for our 8-inch rifle (called multi-perforated grains) are cylinders about half an inch in diameter and an inch long, with seven small longitudinal perforations, one of which coincides with the axis of the cylinder, while the others are symmetrically disposed about the axis. These perforations in the grain under consideration are about one-twentieth of an inch in diameter. For the 14-inch rifle these dimensions are increased about 70 per cent. It will readily be seen that it requires a large part of the entire time the projectile remains in the gun after firing for these grains to burn up. Indeed it frequently happens that they are not all consumed until after the projectile leaves the bore.

It is impossible, in an article like this, to furnish all the details of the deduction of a formula for giving the velocity of a projectile in the bore of a gun while the powder is burning. The problem is a very complicated one and has not yet been rigidly solved. Many assumptions have to be made which are not strictly true, and formulas require to be tested at every point by comparing computed with measured results. It has been established by experiments due chiefly to M. Vieille that grains of modern powder burn in parallel layers, and that the velocity of combustion under the constant pressure of the atmosphere is uniform. It is also known that the velocity of combustion, and therefore the disengagement of gas, increases with the pressure, so that in attempting to deduce a formula for the velocity of a projectile in a gun where the pressure is constantly changing, and greatly exceeds the atmospheric pressure, the law which governs the velocity of combustion becomes of the first importance. It is believed that the law of the square root of the pressure, propounded by Sarran, is very near the truth. At any rate the formula for velocity based upon this law gives results agreeing very well with observation, as will be shown later.

The first important step in deducing a formula for velocity while the powder is burning was made by Ensign (later Captain) J. H. Glennon, United States navy, who in 1888 published a paper in *Proceedings of the United States Naval Institute* entitled *Velocities and Pressures in Guns*, in which he gave an original expression for the weight of powder burned in a gun at any time as a function of the distance traveled by the projectile. Colonel Ingalls following up Glennon's idea deduced the following general equations for velocity and pressure while the powder is burning and which apply to all forms of grain:

$$v^2 = MX_1\{1 + NX_0 + N'X_0^2\}$$
$$p = M'X_3\{1 + NX_4 + N'X_5\}$$

In these equations $M$, $M'$, $N$, and $N'$ are functions of the gun and powder constants, while $X_0$, $X_1$, $X_3$, $X_4$, and $X_5$ are functions of $x$ and $n$, that is, of the number of volumes of expansion, approximately, and the ratio of the specific heats of the powder gas.

Noble and Abel determined the ratio of specific heats of the gases of fired *gunpowder* at temperature of explosion to be 1⅓ and therefore $n = 3$. With this value of $n$ Ingalls has computed and published an extensive table of the $X$ functions by means of which their values, or rather their logarithms, can be taken out for any value of $x$, or—what is the same thing—for any travel of the projectile, by simple interpolation.

For certain forms of grain $N$ and $N'$ may be regarded as zero and the expressions for $v^2$ and $p$ are reduced to the first term of the second member. This simplification occurs with very thin flat grains of large surface; and with long cylindrical grains with an axial perforation. With other forms of grain,—long slender strips or cylinders,—the third term may be omitted but not the second. While with spherical, cubical, and multi-perforated grains all the terms must be retained theoretically; though in many cases the third term is so small that it may safely be neglected.

The constants $M$, $M'$, $N$, and $N'$ may be determined in various ways. The following data must be known: *Gun Constants.* Calibre; travel of projectile in bore from seat to muzzle; volume of powder chamber. *Powder Constants.* Size, form, and density of grains; force of the powder and velocity of burning under atmospheric pressure. *Elements of Loading.* Weight of powder charge and of projectile. With these data the constants can all be readily computed by suitable formulas. If the force of the powder and velocity of burning in open air are not known, the constants can then be found by means of a measured muzzle velocity and the maximum pressure, which last is assumed to be the pressure given by a crusher gauge placed, usually, in the cartridge bag or in some part of the powder chamber. Or, the constants may be determined more accurately by means of two measured velocities in the bore when these are available.

*Comparison of Theory with Observation.*—"The solution of the problems of interior ballistics requires the adoption of several hypotheses and simplifications that are only approximately true, and the practical value of the formulas deduced can be established only by a comparison of predicted results with experiment, which is the final test of all physical formulas." For a first comparison take the velocities measured in the 10-inch rifle with the Noble chronoscope, already mentioned. In this case the constants $M$, $M'$, and $N$ were determined by the two measured velocities 1027 f.s. and 1464 f.s. corresponding, respectively, to travels of the projectile of 2.26 and 8.26 feet. From these data the following equations for velocity and pressure were deduced:

$$v^2 = 889860\,X_1\{1 - 0.05364\,X_0\}$$
$$p = 57834\,X_3\{1 - 0.05364\,X_4\}.$$

(For the details of the calculations, consult Ingalls's *Interior Ballistics*, 2d ed., Fort Monroe, 1894.) The formula for pressure has the same degree of accuracy as the velocity formula since the former was derived from the latter by differentiation, according to the principles of mechanics.

Table I, which is sufficiently explained by its caption, gives the measured and computed velocities for the distances traveled by the projectile found in the first column. The differences in the fourth column show a wonderful agreement between theory and observation. They are all, except the first, less than 1 per cent of the measured velocity and are practically nil. If the agreement of the computed velocities with those measured with the Noble chronograph is a proof of the correctness of the velocity formula, so, conversely, is this agreement an illustration of the precision and accuracy with which this chronograph measures extremely small intervals of time.

TABLE I

TABLE OF MEASURED AND COMPUTED VELOCITIES OF A 300-POUND PROJECTILE IN THE BORE OF A 10-INCH RIFLE, FIRED WITH A CHARGE OF 70 POUNDS OF PEBBLE GUNPOWDER. ALSO COMPUTED PRESSURES

| Travel of projectile in feet, from start | Measured velocity in feet per second | Computed velocity | Measured minus computed | Pressure on bore of projectile in pounds per square inch | Remarks |
|---|---|---|---|---|---|
| 0.41 | 436.0 | 450.8 | −14.8 | 34,752 | Maximum pressure |
| 0.50 | 501.7 | 505.0 | −3.3 | 34,557 | |
| 0.82 | 657.0 | 661.0 | −4.0 | 32,005 | |
| 1.06 | 750.0 | 748.2 | 1.8 | 29,648 | |
| 1.65 | 911 0 | 908.0 | 3.0 | 24,400 | |
| 2.06 | 992.8 | 992.5 | 0.3 | 21,403 | |
| 2.26 | 1027.0 | 1027.0 | 0.0 | 19,302 | |
| 2.74 | 1097.0 | 1098 0 | −1.0 | 17,580 | |
| 3.06 | 1137.0 | 1139.0 | −2.0 | 16,121 | |
| 7.06 | 1412.0 | 1420.0 | −8.0 | 7,022 | |
| 8.26 | 1464 0 | 1464.0 | 0.0 | 5,476 | |
| 10.15 | 1527.0 | 1516.0 | 11.0 | 4,269 | Muzzle |

Other and even more striking examples of the agreement between the measured and computed velocities of a projectile in a gun may be found in the *Journal of the United States Artillery*, vols. 25, 26, and 39, and in Ingalls, *Interior Ballistics*, pp. 107, 129, 130, 133, 161, and 165.

**Multiperforated Grains.** These grains, which have already been described and which are exclusively used in the larger guns of both the army and the navy, are the only grains which burn with an increasing surface of combustion; but they do not retain their original form until completely consumed—as do all other forms of grain in use—but break up when the least dimension, called the web thickness, is burned through, into 12 slender rods, or "slivers," as they are technically called, which burn according to a law different from that by which the entire grain burned. Thus two independent sets of formulas for velocity and pressure become necessary to represent what actually takes place in the gun. This may be illustrated by an example pertaining to the 14-inch seacoast rifle. This piece was fired Jan. 23, 1911, with a charge of 328 pounds of nitro-cellulose powder plus an "igniter" of 9 pounds of rifle, or saluting, powder, and a projectile weighing 1664 pounds. The muzzle velocity, measured in the usual way with a Boulengé chronograph (see section on *Exterior Ballistics*), was 2252 f.s. and the maximum pressure, shown by a crusher gauge, was 43,640 pounds per square inch, or a pressure on the entire base of the shot, of 3359 tons of 2000 pounds. From these data were obtained the following equations for the velocity and pressure on the base of the projectile.

From the origin to a travel of 210.75 inches:

$$v^2 = 1197100\, X_1 \{1 + 0.03542\, X_0 - 0.00061\, X_0^2\}$$
$$p = 53102\, X_3 \{1 + 0.03542\, X_4 - 0.00061\, X_5\}.$$

From a travel of 210.75 inches to the muzzle:

$$x^2 = 2051700\, X_1 \{1 - 0.05180\, X_0\}$$
$$p = 91013\, X_3 \{1 - 0.05180\, X_4\}.$$

(For the details of this example, consult Ingalls, *Interior Ballistics*, pp. 162 et seq.)

To use these formulas for any travel of projectile the first operation would be to divide the travel expressed in inches by 45.465, which is the reduced length of the initial air space in the powder chamber, in inches. That is, it is the length of a cylinder of the diameter of the bore whose volume is the same as the air space (space not occupied by the powder charge) in the chamber. With this quotient, which is designated by $x$, and is the argument of the table of the $X$ functions, take out from the proper columns the values of such of the functions as are required. As an example, what would the pressure be when the projectile has traveled 36.372 inches? By division, as above indicated, we find $x = 0.8$, and then from the table, $X_3 = 0.7249$, $X_4 = 4.03$, and $X_5 = 14.91$. Substituting these values of $X_3$, $X_4$, and $X_5$ in the first of the above expressions for the pressure, it comes out 43,640 pounds per square inch. In a similar manner the velocity at this travel would be found to be 991.4 feet per second. At the muzzle, where the travel of projectile is 413.85 inches, the second set of formulas gives $v = 2252$ f.s. and $p = 9485$ pounds per square inch. This large muzzle pressure is of course wasted, and could only be utilized by increasing the length of the gun. It may be shown that the velocity in this case could never exceed 3150 f.s. whatever may be the length of the gun.

*Muzzle Energy.*—The muzzle energy of a projectile, designated by Em, is given by the equation:

$$Em = \frac{wv^2}{4000g} \text{ foot-tons},$$

which becomes for the 14-inch gun we have been considering

$$Em = \frac{1664\ (2252)^2}{4000 \times 32.16} = 65600 \text{ foot-tons};$$

and this enormous energy is produced in about $\frac{1}{33}$ of a second. A horse power is defined "as the rate at which work is done when 33,000 pounds (16.5 tons) are raised one foot in one minute." According to this definition the muzzle energy of this shot represents nearly three million horse power.

*Theoretical Value of the Force of the Powder.* —The theoretical value of this factor (designated by $f$) is

$$f = \frac{p_0 v_0 T}{273},$$

where $p_0$ is the normal atmospheric pressure; $v_0$ the volume of unit weight of the powder gas at temperature of combustion and under normal atmospheric pressure; and $T$ the absolute temperature of combustion. By means of this formula and the best procurable values of $v_0$ and $T$ for nitro-cellulose powder the value of $f$ comes out 2076.7. The value of this factor computed on the supposition that (1) is a true equation, with the data already used for the 14-inch gun, is 1759.7. According to these calculations about 15 per cent of the total work done by the expansion of the gases of combustion was expended in doing other work than that of giving energy of translation to the projectile. See EXPLOSIVES.

### EXTERIOR BALLISTICS

In exterior ballistics we determine the path of a projectile from the instant it leaves the gun until it strikes the target, or, in the case of shrapnel, bursts in the air at any desired point, knowing its shape, calibre, weight, its initial velocity of translation and rotation, the resistance it meets from the air, and the action of gravity.

**History.** The theories relative to the motion of projectiles were originally of the crudest kind. Up to the middle of the sixteenth century bullets were supposed to move in right lines from the gun to the target, and shells fired from mortars were thought to describe a path made up of two right lines joined by an arc of a circle. The trajectory was divided into three parts: First, *violent*, which was thought to be a right line; second, *middle* or *mixed*, which was an arc of a circle; and third, the *natural*, which was a right line. In a work on gunnery, published by Niccolò Tartaglia, a Venetian, in 1537, he proved that no part of the path of a projectile could be a right line, and that the greater the velocity of the projectile the flatter is its path. Tartaglia also invented the gunner's quadrant (q.v.) for giving elevation. Galileo demonstrated the parabolic form of the trajectory in vacuo in his *Dialogues on Motion*. Newton's discovery of the law of gravitation made plain the cause of the curvilinear motion of projectiles. By the use of the calculus, his own invention, he determined the momentum transferred from the projectile to the particles of air at rest, which is the method followed at the present day, and which leads to the law of the square of velocity. So far as a rigorous solution of the trajectory in air is concerned, the problem remains to-day about where Newton and Jean Bernouilli left it.

**Ballistic Machines.** There are two ways in which the velocity of a projectile after leaving the gun may be determined experimentally —by measuring the projectile's momentum, and by measuring the time required for the projectile to pass over a given space. The first method is the older; and many years ago, when guns and projectiles were small, velocities low, and ranges short, the results were sufficiently accurate for most practical purposes. Modern gunnery is much indebted to the now discarded *ballistic pendulum* and *gun pendulum*, which have long since been supplanted by the cheaper and more accurate machines using the second method.

The *Ballistic Pendulum* was invented about 1743 by Benjamin Robins, who was the first to make a systematic and intelligent series of experiments to determine the velocity of projectiles. The principle of the ballistic pendulum, as well as of Count Rumford's gun pendulum, is the transformation of the elements of the projectile's momentum from a small mass and high velocity to a large mass and low velocity, more easily measured by the methods then known. The ballistic pendulum consisted of a plate of iron to which was bolted a block of wood to receive the impact of the ball, the whole suspended from a horizontal axis about which it was free to revolve. The block when struck by the ball recoiled through a certain arc which was measured by the length of tape wound from a reel. The arc of oscillation being measured, the velocity of the ball can be found by calculation. This light pendulum could stand the impact of musket balls only, but with it Robins began the science of gunnery by determining the relations which should exist between the calibre, length of barrel, and charge of powder. Dr. Hutton (1775–91), Dr. Gregory (1814), and Major (later Colonel) Mordecai, of the United States Ordnance Department (1842–45), made many experiments with improved ballistic pendulums.

By the second method a projectile's velocity is determined by measuring the time required to pass over a known space in its path. We will not take time to describe any of the numerous machines invented for this purpose prior to 1840, when Wheatstone, the celebrated English electrician, suggested the use of electricity for measuring small intervals of time. Some of them were very ingenious, but they were all lacking in precision even for the low velocities then obtainable. A simple calculation will illustrate this. Suppose the known space to be 150 feet and the observed time of describing it $\frac{1}{10}$ of a second. Then the velocity, which is equal to the space divided by the time, would be 1500 feet per second; and to make this true within one foot, the time must not be in error more than $\frac{1}{1500}$ of a second. It is only by the use of electricity that such precision is possible. The general method of using electro-ballistic machines is as follows: Two vertical target frames or screens are placed perpendicular to the plane of fire; the first as near the gun as possible without being sensibly affected by the blast, and the second a measured distance further from the gun, say 150 feet ($s$). A copper wire passes several times across each screen forming a grating through which the projectile cannot pass without breaking the wire. From the screens the wires go to the chronograph which may be in any convenient place. The passing of the projectile through each screen is instantly recorded by the chronograph so as to give the interval of time ($t$) between these occurrences. We then have

$$v = \frac{s}{t},$$

where $v$ is the mean velocity at the middle point between the screens, which can be reduced to muzzle velocity by a suitable formula.

The electro-ballistic machines most in use at the present day are the Boulengé chronograph and the Bashforth chronograph—the former used

principally on the continent of Europe and in this country and the latter in England.

The Boulengé chronograph, invented by Captain Le Boulengé of the Belgian Artillery, was greatly improved by Captain Bréger of the French Marine Artillery. The following is a description of the modified instrument, taken substantially from *Ordnance Notes*, No. 193. It

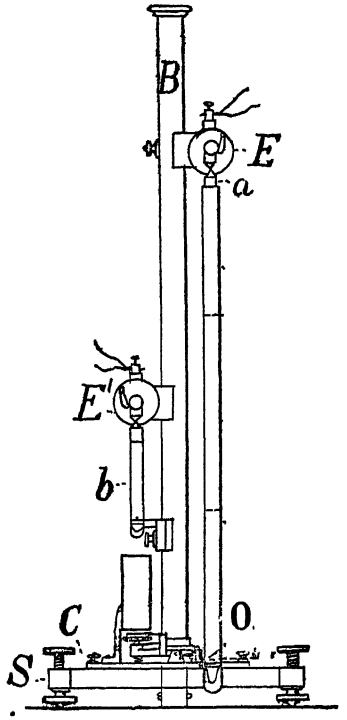



FIG. 3.— THE BOULENGÉ CHRONOGRAPH.

*a* and *b*, suspended rods, *E* and *E'*, electro-magnets; *B* and *S*, stand with leveling screws; *O*, marking knife.

consists of a vertical column, *B* (Fig. 3) to which are affixed two electro-magnets; the right-hand one, *E*, is actuated by the current of the first screen, and supports an armature called the *chronometer rod*, *a*. The left-hand magnet, *E'*, is actuated by the current of the second screen and supports an armature called the *registrar*, *b*. The chronometer, *a*, is a long cylindrical brass tube terminating at its upper extremity in a piece of soft iron and bearing at its lower end a heavy steel bob which causes it to fall vertically when released. It is covered by a closely fitting zinc cylinder called the recorder. The registrar is of the same weight as the chronometer. When the projectile passes through the first screen the chronometer is liberated and falls vertically, continuing close to the marking knife, *O*. The second screen being pierced, the registrar falls upon a horizontal plate, *b* (Fig. 4), which turns upon an axis and releases the spring, *s*. The spring is furnished with a square knife, *m*, which, when released, strikes the zinc recorder and leaves an indentation upon it. The position of this indentation, which is a sharp, well-defined cut, on the recorder shows the distance the chronometer had fallen while the projectile was passing over the distance between the screens plus the time required for the machine to operate. A simple application of the law of falling bodies gives the time.

The Boulengé chronograph, from its simplicity of construction and the ease with which it can be manipulated, is well adapted for measuring muzzle velocities and will probably continue to be used for that purpose. But in studying the laws which govern the resistance of the air to the motion of projectiles, it is necessary to know the velocity of the same projectile at several equidistant points of its path and thus to determine its loss of velocity, or what is technically known as the retardation. This might be done by employing several Boulengé chronographs—one for each pair of screens; and theoretically there can be no objection to their use. But the practical objections to the multiplication of instruments and observers are obvious. In 1864 the Rev. F. Bashforth, B.D., then professor of mathematics at the Artillery College, Woolwich, invented a chronograph which is capable of measuring with great accuracy the time occupied by a projectile passing over any number of successive spaces between equidistant screens connected electrically with the chronograph. Bashforth made a great many experiments with his chronograph, principally at Shoeburyness, between the years 1865 and 1879, and laid the foundation of our knowledge of the resistance of the air, as affecting the motion of a projectile.

It has been demonstrated by experiment that the resistance of the air to the motion of similar projectiles moving with the same velocity, is proportional to the surface exposed, that is, to the square of the projectile's diameter ($d^2$), and to some function of the velocity. If $r$ is the retardation, and $C$ a factor depending upon the weight, diameter, length, and form

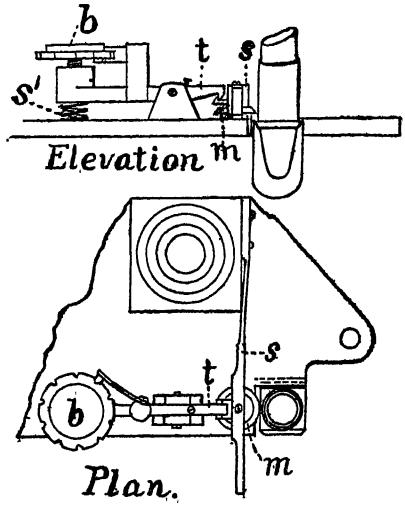



FIG. 4.— MARKER OF THE BOULENGÉ CHRONOGRAPH.

*t*, trigger; *s*, spring; *m*, marking knife; *b*, pan for catching short rod; *s'*, spring.

of head of the projectile, its steadiness of flight and the density of the air it encounters, we may write the following equation:

$$Cr = kf(v),$$

where $k$ is a coefficient to be determined by experimental firing.

It is impossible with our present knowledge to determine the exact form of $f(v)$ for all velocities, from first principles. As has been already stated, Newton found

$$f(v) = kv^2;$$

but experiments have abundantly shown that this form of $f(v)$ is true for only a limited range of velocities. It is certain that its form changes several times between the extreme limits of velocities employed in gunnery. Colonel Siacci of the Italian Artillery deduced a complicated empirical expression for $Cr$ in terms of the velocity, which gives retardations agreeing very closely with experiment from $v = 100$ to $v = 3000$ f.s. It possesses, however, no practical advantages over the customary method of expressing the retardation by suitable powers of the velocity so chosen as to represent the mean retardations over certain ranges of velocity ascertained by experiment. We therefore have on this hypothesis

$$Cr = kv^n$$

The values of $k$ and $n$ for oblong projectiles deduced by General Mayevski were based upon a discussion of the Krupp firings made at Meppen in 1881, for velocities up to 700 m.s.; and were subsequently extended by Colonel Zaboudski to include velocities up to 1100 m.s. The numbers as published were in kilogram-meter units, and were reduced by Colonel Ingalls to foot-pound units and made the basis of his extensive ballistic tables published by the United States government in 1900. They are continued in Table II.

TABLE II

| Range of velocities | Value of exponent $n$ | log. k |
|---|---|---|
| 3600 f.s. | | |
| 2624.2 | 1 55 | 7.6090480−10 |
| 1804.9 | 1.70 | 7.0961978−10 |
| 1375.2 | 2 | 6.1192596−10 |
| 1228.9 | 3 | 2.9809023−10 |
| 967.80 | 5 | 6.8018712−20 |
| 787.86 | 3 | 2.7734430−10 |
| 0 | 2 | 5.6698914−10 |

As an illustration of the meaning of these numbers we have, for example, for velocities between 2624.2 f.s. and 1804.9 f.s., the expression

$$Cr = 0.0012479\ v^{\cdot_7};$$

and for velocities between 1804.9 f.s. and 1375.2 f.s.,

$$Cr = 0.00013160\ v^2,$$

and so for the other velocities. The coefficients, $k$, are so determined that the value of $Cr$ computed by both these equations is the same for $v = 1804.9$ f.s. So that, although there is a sudden change in the law of retardation at this point, there is no apparent break in the ballistic table, which depends upon these laws. See Table III.

**Horizontal Trajectory.** The horizontal trajectory is that part of a complete trajectory lying above the level of the gun—that is, when the point of fall is at the height of the gun. In vacuo a projectile would describe an arc of a parabola whose axis is vertical; and as a parabola is symmetrical with respect to its axis the descending branch of the trajectory would be the same as the ascending. The angle of fall would be the same as the angle of elevation and the striking velocity the same as the muzzle velocity. But in the actual trajectory, owing to the resistance of the air, this symmetry disappears. The descending branch is steeper than the ascending branch, the angle of fall is greater than the angle of departure, and the range and striking velocity are less than in vacuo. For very flat trajectories, that is to say, when the angular elevation given to the piece is not more than 4 or 5 degrees of arc, the curvature of the horizontal trajectory may be omitted and the motion considered rectilinear. In this case, by means of the expressions for $Cr$ given in Table II, equations may easily be found giving the horizontal range ($X$) and time of flight ($T$) in terms of certain functions of the muzzle and striking velocities ($V$ and $v$). These equations are the following:

$$X = C\{S(v) - S(V)\}$$

and

$$T = C\{T(v) - T(V)\}.$$

The factor $C$, called the ballistic coefficient, is made up of several factors when complete. But for type projectiles and for normal conditions of the atmosphere its value for flat trajectories is

$$C = \frac{w}{d^2},$$

in which $w$ is the weight of the projectile and $d$ its diameter in inches. It will be seen that $C$ measures the ability of a projectile to overcome the resistance of the air; or, as we may say, it is the measure of the ballistic efficiency of a projectile. The $S$ and $T$ functions, called, respectively, the space and time functions, are tabulated with other functions given later with the velocity ($v$ or $V$) for the argument. They were computed by means of formulas derived from the tabulated values of $Cr$ given above.

As an example of the use of the above equations for range and time of flight, take the following data pertaining to the 14-inch rifle: $d = 14$ in.; $w = 1664$ lbs.; $V = 2252$ f.s. With these data compute the striking, or remaining, velocity ($v$), for a horizontal range of 3 miles, or 15,840 feet, and the time of flight.

The expression for the range gives, by transposition,

$$S(v) = \frac{X}{C} + S(V);$$

or, giving to $X$, $C$, and $V$ their values,

$$S(v) = \frac{196 \times 15840}{1664} + S(2252)$$
$$= 1865.8 + 4159.4 = 6025.2.$$

The space function of the muzzle velocity is interpolated from the ballistic table (see Table III); as is also the remaining velocity ($v$) from its computed space function. From the table we find $v = 1774.98$ f.s. For the time of flight we have

$$T = \frac{1664}{196}(2.398 - 1.463) = 7.938 \text{ seconds.}$$

It may be interesting to consider for a moment the enormous effect exerted by the air upon a swiftly moving body, as shown by this example. The loss of energy of the projectile in its pas-

sage of three miles through the air is given by the equation

$$\text{Loss of energy} = \frac{w(V^2-v^2)}{2g} = \frac{w(V+v)(V-v)}{2g}.$$

Applying the numbers given above, taking $g = 32.16$ f.s., and dividing by 2000 to reduce the result to foot-tons, we find the loss of energy to be 24,848 foot-tons—and this in about 8 seconds.

At the firing ground of the Krupp works, Essen, remaining velocities have been repeatedly measured for even greater ranges than three miles, and the computed velocities completely verified, and also the computed times of flight.

When the angle of elevation exceeds 5° or 6°, the error resulting from disregarding the curvature of the trajectory begins to be felt. But Siacci has shown that this error is practically compensated by substituting for the striking velocity ($v$) what he called the *pseudo velocity* and designated by the letter $u$. The relation between the real and pseudo velocities is expressed by the equation

$$u = v\frac{\cos\theta}{\cos\phi},$$

in which $\phi$ is the angle of departure, or initial inclination of the trajectory to the horizontal plane, and $\theta$ the inclination of any other point of the trajectory. At the far end of the horizontal range the inclination ($\theta$) is called the angle of fall and is designated by $\omega$. At the summit of the trajectory $\theta$ is zero. The pseudo velocity is employed in all ballistic formulas in place of the real velocity ($v$); but at the muzzle, where $\theta = \phi$, $u$ becomes the muzzle velocity ($V$), as is shown by the above equation. The value of $u$ at the point of fall will be distinguished by $u'$.

**Fundamental Formulas.** The following equations, due to Colonel Siacci (consult *Giornale d' Artiglieria e Genio*, Rome, April, 1880), have been adopted by artillerists the world over for the solution of the principal problems of exterior ballistics:

$$x = C\{S(u) - S(V)\}$$

$$\frac{y}{x} = \tan\phi - \frac{C}{2\cos^2\phi}\left\{\frac{A(u)-A(V)}{S(u)-S(V)} - I(V)\right\}$$

$$\tan\theta = \tan\phi - \frac{C}{2\cos^2\phi}\{I(u) - I(V)\}$$

$$t = \frac{C}{\cos\phi}\{T(u) - T(V)\}.$$

In these equations $x$ and $y$ are the rectangular coördinates of any point of the trajectory, the origin being at the muzzle of the gun, and the axis of $x$ horizontal; and $t$ the time of flight to the point $x$, $y$. $A(u)$ and $A(V)$ are certain functions of the velocity—muzzle or pseudo—and are called altitude functions. $I(u)$ and $I(V)$ relate to the inclination of the trajectory and are called inclination functions. The other symbols have already been defined.

At the summit of the trajectory $\tan\theta$ becomes zero and the third of the above equations reduces to

$$\sin 2\phi = C(I(u_0) - I(V)),$$

in which $u_0$ is the pseudo velocity at the summit. By means of this formula and the ballistic table, $u_0$ can be calculated when $C$, $V$, and $\phi$ are known.

For the horizontal trajectory the above equations reduce to

$$x = C(S(u') - S(V))$$

$$\tan\omega = \frac{C}{2\cos^2\phi}(I(u') - I(u_0))$$

$$T = \frac{C}{\cos\phi}(T(u') - T(V))$$

$$I(u_0) = \frac{A(u') - A(V)}{S(u') - S(V)}.$$

We will now complete the calculations pertaining to the 14-inch gun by computing the angle of elevation ($\phi$) and angle of fall ($\omega$). The striking velocity, which for this particular trajectory is sensibly the same as the pseudo velocity, has been found to be 1774.98 f.s. By interpolation from the abridged ballistic table the following additional numbers are obtained:

$$A(V) = 189.79$$
$$A(u') = 337.18$$
$$I(V) = 0.06510$$
$$I(u') = 0.09532$$

By means of these numbers and the value of $S(u') - S(V)$ already computed, we find

$$I(u_0) = 0.07900 \quad \therefore u_0 = 1994.375$$
$$\phi = 3° 23'$$
$$\omega = 3° 59'.$$

When the angle of elevation is considerable, the projectile passes through air in the middle of its course less dense than at either end of its trajectory, and the less resistance offered to the projectile increases the range and must be accounted for in the ballistic formulas. A mean resistance is usually assumed due to a height of two-thirds the greatest altitude of the projectile, and a correction applied to the ballistic coefficient in the shape of a factor greater than unity taken from a table of factors having the height of projectile for argument. By a combination of the fundamental formulas given above we get the following general expression for $y$:

$$y = \frac{C^2}{2\cos^2\phi}(zI(u_0) + A(V) - A(u)),$$

in which $z = \frac{x}{C}$.

By means of this formula the height of a projectile at any distance ($x$) from the gun can be computed. For the summit or maximum ordinate this equation becomes

$$y_0 = \frac{C^2}{2\cos^2\phi}(z_0 I(u_0) + A(V) - A(u_0)),$$

in which $z_0 = S(u_0) - S(V)$.

For the trajectory already considered, we have found $u_0 = 1994.375$, and from the ballistic table we find

$$S(u_0) = 5128.15$$

and $A(u_0) = 259.31$,

and then $z_0 = 968.75$

and $y_0 = 253.6$ ft.

This value of the maximum ordinate affords a good idea of the flatness of the trajectory of a high-power gun for a range of three miles, and

suggests that a considerable portion of the trajectory at either end would be danger space for a war ship.

One of the principal objects in view in the deduction of ballistic formulas and the preparation of tables for their use is the computation of range tables for the different guns in service. "A range table should be so constructed as to afford all the data necessary to enable the gun for which it was prepared to be properly and promptly laid in such a manner that its projectiles may hit an object whose distance from the gun is known, and also to predict the effects of the shot upon the object. The constants upon which a range table is based are the calibre or inclined to the horizon, within certain limits." But these limits are ample for nearly all practical purposes. According to this principle if $\phi'$ is the range-table angle of elevation for a certain horizontal range, then the angle of elevation required to hit an object at the same distance but at an angular elevation ($\epsilon$) above the gun will be $\phi + \epsilon$; and this addition to $\phi$ is made by simply pointing the gun at the object. It has been shown by calculation that a ship in the offing firing at the Signal Station battery at Gibraltar, which is 1270 feet high, with a high-power gun could safely employ the range-table angle of elevation. And this is probably an extreme case.

TABLE III

ABRIDGED BALLISTIC TABLE

From Table I, *Ingalls's Ballistic Tables*, "Artillery Circular M"

| $v$ or $u$ | $S(u)$ | $D$ | $A(u)$ | $D$ | $I(u)$ | $D$ | $T(u)$ | $D$ |
|---|---|---|---|---|---|---|---|---|
| 2300 | 3987.6 | 35.6 | 178.78 | 2.25 | 0.06297 | 0.00043 | 1.388 | 0 015 |
| 2290 | 4023 2 | 35.7 | 181.03 | 2.27 | 0.06340 | 0.00044 | 1.403 | 0.016 |
| 2280 | 4058.9 | 35.8 | 183.30 | 2.30 | 0.06384 | 0.00044 | 1.419 | 0.016 |
| 2270 | 4094.7 | 35.9 | 185.60 | 2 32 | 0.06428 | 0.00045 | 1.435 | 0.015 |
| 2260 | 4130.6 | 36.0 | 187.92 | 2.34 | 0.06473 | 0.00046 | 1.450 | 0.016 |
| 2250 | 4166.6 | 36.2 | 190.26 | 2.36 | 0.06519 | 0.00046 | 1.466 | 0.016 |
| 2240 | 4202.8 | 36.2 | 192.62 | 2.39 | 0.06565 | 0.00047 | 1.482 | 0 017 |
| 2230 | 4239 0 | 36.4 | 195.01 | 2.41 | 0.06612 | 0 00047 | 1.499 | 0.016 |
| 2220 | 4275.4 | 36.4 | 197.42 | 2.44 | 0.06659 | 0.00048 | 1.515 | 0.016 |
| 2210 | 4311.8 | 36.6 | 199.86 | 2.46 | 0.06707 | 0.00048 | 1.531 | 0.017 |
| 2200 | 4348.4 | 36.7 | 202.32 | 2.50 | 0.06755 | 0.00049 | 1.548 | 0.017 |
| 1810 | 5876.7 | 42.1 | 323.28 | 3.90 | 0.09235 | 0.00083 | 2.315 | 0.023 |
| 1800 | 5918 8 | 42.3 | 327.18 | 3.96 | 0.09318 | 0 00084 | 2.338 | 0.024 |
| 1790 | 5961.1 | 42.6 | 331.14 | 4.02 | 0.09402 | 0 00086 | 2.362 | 0 024 |
| 1780 | 6003 7 | 42.8 | 335.16 | 4.08 | 0.09488 | 0.00088 | 2.386 | 0 024 |
| 1770 | 6046.5 | 43.1 | 339.24 | 4.14 | 0.09576 | 0.00089 | 2.410 | 0 024 |
| 1760 | 6089.6 | 43.3 | 343.38 | 4.21 | 0.09665 | 0 00090 | 2.434 | 0.024 |
| 1750 | 6132.9 | 43.5 | 347.59 | 4.27 | 0.09755 | 0.00092 | 2.458 | 0.025 |
| 510 | 25114.0 | 42.0 | 16021.0 | 93.6 | 2.22455 | 0.01040 | 26.472 | 0.082 |
| 509 | 25156.0 | 42.0 | 16114.6 | 94.2 | 2.23495 | 0.01046 | 26.554 | 0.083 |
| 508 | 25198.0 | 42.2 | 16208.8 | 94.8 | 2.24541 | 0 01052 | 26.637 | 0.083 |
| 507 | 25240.2 | 42.2 | 16303.6 | 95.5 | 2.25593 | 0.01059 | 26.720 | 0.083 |
| 506 | 25282.4 | 42.3 | 16399.1 | 96.1 | 2.26652 | 0 01065 | 26.803 | 0.084 |
| 505 | 25324.7 | 42.4 | 16495.2 | 96.8 | 2.27717 | 0.01071 | 26.887 | 0.084 |

and weight of the projectile and the shape of its head, from which data is deduced the ballistic coefficient for a standard density of the air; also the muzzle velocity and the jump of the gun—that is, the elevation or depression of the muzzle due to the shock of the discharge. These should be determined with all the precision possible before beginning the construction of the table. With these data are computed for a series of horizontal ranges, forming the argument of the table, and which occupy the first column, the angle of departure, angle of fall, striking velocity, and time of flight. These are the fundamental elements required in a range table; but it should also give the variations of the angle of departure due to variations of the muzzle velocity and of the density of the air; the drift of the projectile due to rifling; slope of fall; danger space; penetration of different kinds of armor; probable rectangle of hits, etc., all of which must be taken into account for effective work."

*Rigidity of the Trajectory.*—A range table gives the angle of elevation necessary to hit an object on the same level as the gun. But it happens in practice that the object fired at is almost always above or below this level; and here comes in the principle of the *rigidity of the trajectory* which asserts that "the relations existing between the elements of a trajectory and the chord representing the range, are sensibly the same whether the latter be horizontal

If we imagine a projectile whose diameter and weight are so adjusted as to make the ballistic coefficient unity—like the projectile used with the obsolete 3-inch wrought-iron field gun—for such a projectile the differences of the space functions in the upper part of this table show the distances the projectile would travel, moving with the velocity in the first column, while its velocity was reduced by the resistance of the air, 10 f.s. For example, the projectile starting with a velocity of 1810 f.s. would travel 42.1 feet while its velocity was reduced to 1800 f.s. The lower part of the abridged table shows that the projectile would travel the same distance while the velocity was reduced from 510 f.s. to 509 f.s.

A projectile whose ballistic coefficient is 7, which is nearly that of a 12-inch shot, would range seven times as far, or 294.7 feet, before losing 10 foot-seconds of its velocity.

The most important of the problems of exterior ballistics can be solved by means of the formulas here given in connection with the general ballistic table. But the solution of many of them is greatly facilitated by the use of certain auxiliary formulas and tables, for a description of which the reader is referred to the works mentioned at the close of this article.

The formulas and tables of exterior ballistics like those of interior ballistics are more or less empirical and must be tested by actual experiment before they can be fully accepted. A few ex-

amples of the agreement between computation and observation in high-angle firing, where the errors of theory should be the greatest, are here given:

1. "A shot was fired April 28, 1892, on Krupp's practice ground at Meppen, in presence of the Emperor, from a 24 cm. coast gun, with an angle of elevation of 44°. The weight of the projectile was 215 kilos=474 lbs., and the muzzle velocity 640 m.s.=2100 f.s. The range was measured and found to be 20.226 m.=22,120 yds." The data of this example were taken from the *Exhibition Catalogue of the Cast-Steel Works of Fried. Krupp*, p. 31 (Chicago, 1893). It is worked out in full in the introduction to Ingalls's *Ballistic Tables* (page v), and the results only will be given here. The computed range was 22,138 yards. The computed time of flight was 71.2 sec. Observed time, 70.2 sec. The projectile reached a height—computed as explained above—of 21,431 feet, and the correction for tenuity was made for two-thirds this altitude, or 14,287 feet.

2. The "jubilee shots," so called, were fired at Shoeburyness, England, in the spring of 1888 with a 9.2-inch wire-wound gun. Weight of projectile, 380 lbs.; muzzle velocity, 2360 f.s. There were three series of shots fired at 30°, 35°, and 40° elevation, respectively. The ranges were all measured and the times of flight observed. Table IV gives the mean measured ranges and times of flight, and those computed:

TABLE IV

| Angle of elevation | Mean measured range (yards) | Computed range (yards) | Difference | Mean observed time of flight, seconds | Computed time of flight, seconds | Difference |
|---|---|---|---|---|---|---|
| 30° | 17922 | 17881 | 41 | 50 25 | 50.53 | −0.28 |
| 35° | 19175 | 19435 | −260 | 57 11 | 58 02 | −0 91 |
| 40° | 20876 | 20922 | −46 | 63 45 | 64.30 | −0.85 |

Many other striking examples of the agreement between computed and observed ranges and times of flight, with guns of all calibres, and with angles of observation from zero to 45°, are given in Ingalls's *Handbook of Problems in Exterior Ballistics*.

### BALLISTICS OF PENETRATION

The laws which govern the penetration of projectiles into different kinds of armor are very obscure, and little has been done up to the present time save the determination of empirical formulas, which satisfy with more or less exactness the measured penetrations upon which they were based. From among the numerous formulas which have been published the following three are selected as typical and are probably as correct as any:

1. Wrought-iron plates (Tresidder).

$$\tau = [5.5795 - 10]\frac{w^{\frac{1}{2}}v^{\frac{3}{2}}}{d^{\frac{1}{2}}}.$$

2. Krupp cemented plates, by capped armor-piercing shot.

$$\tau = [5.2685 - 10]\frac{w^{\frac{1}{2}}v^{\frac{3}{2}}}{d^{\frac{1}{2}}}.$$

3. For hard-faced plates, by uncapped projectiles.

$$\tau = [6.8234 - 10]\frac{w^{\frac{1}{2}}v}{d^{\frac{1}{2}}}.$$

$\tau$ is the penetration in inches.

As an example, take the 14-inch shot already considered. Its striking velocity at a range of three miles was found to be 1775 f.s., and this substituted in the above formulas gives 30.96, 15.48, and 12.88 inches penetration, respectively. This supposes the shot to strike normally. When the shot strikes at an angle with the normal it is customary to multiply the normal penetration by the cosine of this angle to get the true penetration. But this is only a rough approximation.

Consult: Didion, *Traité de balistique;* Bailly, *Traité de balistique rationnelle* (1883); Valher, *Balistique experimentale* (1894); Siacci, *Balistica* (Italian); Mayevski, Zaboudski, *Ballistics* (Russian); La Llave, Ollero, Mata, *Exterior and Interior Ballistics* (Spanish); Bashforth, *The Motion of Projectiles* (1872), *Tables of Remaining Velocity*, etc. (1871), *The Bashforth Chronograph* (1890); Sarrun, Sébert, Hugoniot, Lionville, Vieille, Gossot, French officers and savants whose contributions to *Mémorial d'Artillerie de la Marine* and *Mémorial des Poudres* are of the greatest importance in the study of ballistics; Glennon, *Velocities and Pressures in Guns* (1889); Noble and Abel, *Researches on Explosives* (1874); Noble, *Researches on Explosives* (1894); Lissak, *Ordnance and Gunnery* (1907); and many papers in the *Journal of the Royal Artillery;* Hadcock, *Explanation of the Ballistic Tables*, etc.; Charbonnier, *Balistique* (1905). See PROJECTILES, MOTION OF.

**BALLISTITE.** A form of gunpowder of which the chief constituent is nitroglycerine. See GUNPOWDER; EXPLOSIVES.

**BALLOON.** See AËRONAUTICS.

**BALLOT** (Fr. *ballotte*, It. *ballotta*, dim. of *balla*, a ball). Primarily, a little ball, used in the practice of secret voting. Secret voting is thence called "voting by ballot," whether it be a ball, a ticket, or a mechanical device that is used for the purpose. Wherever the practice of deciding questions by vote has obtained, some form of secret voting has always been found necessary. The dicasts in Greece voted secretly by means of balls, stones, or shells with marks. From this use of marked shells (Gk. *ostrakon*, a shell) in popular voting came the so-called *ostracism*, or secret vote of the people, by which they drove into exile those who became obnoxious to them. *Tabellæ*, or tickets, were chiefly used by the Romans. If the vote concerned a change in the law, the tickets were marked V. R., the initial letters of the words "Uti Rogas," expressing assent to the proposer's proposition; and A for "Antiquo," expressing adherence to the old law. If the vote concerned the election of candidates to a public office, then the tickets bore the names of the candidates. The system of secret voting in Rome was fixed by various laws, of which the Lex Gabinia, 139 B.C., was the first; but the popular assemblies voted by ballot as well as by acclamation long before the passing of these laws. These ancient forms of secret voting continued into the Middle Ages, and especially the method of voting by colored balls, from which the usage takes its name. Balls may be used in voting in various ways: e.g., the voter may deposit a ball in either

of two boxes, so conjoined that no one shall be able to say into which he drops it; or he may be presented with two balls—a white and a black—and so drop one of them into a box that it shall be unknown which he used. This original form of balloting is still commonly employed in voting on the question of the admission or rejection of members of private clubs and in other cases of a similar nature.

In modern times, however, the most common form of ballot has been the written or printed ticket. In the New England Colonies the practice of voting "by papers" was in vogue from the very first, and there is some reason to suppose that some of the Puritans had become familiar with that usage in Holland or elsewhere on the Continent. The ballot has been occasionally employed in legislative assemblies. It was used in the Venetian Senate; and in Great Britain it was first called for, not for the purpose of elections, but of protecting the independence of members of Parliament in their votes on proposed legislation. After the Restoration, in 1660, it was used for purposes of ostracism in the Scottish Parliament. In 1710 a proposal for secret voting was carried in the English House of Commons, but rejected by the Lords. From 1840 to 1845 the ballot was in use in the French Chamber of Deputies. But the idea of secret voting in deliberative and legislative assemblies responsible to the people is now universally abandoned as inconsistent with the fundamental principles of popular government, of which publicity and the free criticism rendered possible by publicity are the great safeguards.

Toward the end of the eighteenth century vote by ballot for elections to the British Parliament was advocated by some of the Whigs; and it was one of the first things demanded by English Reformers at the beginning of the nineteenth century, the followers of Bentham being specially earnest in advocating it. It stood in the original draft of the Reform Bill of 1832. It was first proposed in the British Parliament in 1833 by the historian Grote, who renewed the motion every year till 1839. It was one of the six points in the reform demanded by the Chartists. In 1851 the proposal of vote by ballot was carried in the Commons against the opposition of Lord John Russell and the Liberal Government of that time by a majority of 51. The report of a select committee of the House of Commons in 1869 greatly contributed to decide public opinion in favor of the ballot as a necessary safeguard against corruption, intimidation, disorder, and all sorts of undue influence at elections. The result was Mr. Forster's Ballot Act of 1872, which introduced secret voting at all parliamentary and municipal elections except parliamentary elections for universities. It had already been adopted for school board elections in 1870. With the introduction of the ballot at parliamentary elections, the public election at the hustings, which had been so often associated with rioting and violence, disappeared.

Voting by printed ballot is now the method generally employed in elections in countries where constitutional government exists. The ballots may be furnished by the candidate for office, the political party engaged in promoting his election, or by the government. The first or the second of these plans has usually been adopted in local and general elections in the United States. But the fact that several officers —whose names may conveniently appear on a single ballot—are usually to be voted for at the same election, the great cost of printing and distributing the ballots to multitudes of voters, and the organization of party "workers" requisite for this work of distribution, have combined to render it impracticable, usually, for the individual candidate to supply the voters with ballots bearing his name, and to throw that burden upon the political party. Hence the "party ballot," which has done so much to build up the great party organizations in this country, and which has been a prolific source of corruption, fraud, and intimidation of the individual voter.

These defects of the "party ballot" in the last few years of the nineteenth century produced a widespread public sentiment in favor of a ballot reform, which in many of the United States resulted in the adoption of the third plan above referred to—namely, the printing and distribution of the ballots by the State. With some modifications, due to local conditions or to the efforts of party managers to derive a partisan advantage from the system, the form commonly employed is the "official" or "Australian ballot," so called from the fact that it was the first employed with success in some of the Australian states. Its most distinguishing feature is the arrangement of the names of all the candidates for a given office, whether nominated by party organizations or by independent effort, in order on the ballot, the voter indicating his choice by some mark written by him opposite the name of his chosen candidate. The usual and preferable form of the official ballot is the "blanket ballot," in which the names of all the candidates for an office are arranged in alphabetical order, irrespective of party affiliations. In a few of the States, however, the practice of arranging the candidates in party columns, each column headed by an emblem—as an eagle or a star—has been adopted. This device is justified as a concession to the necessities of the illiterate voter, who may, by placing his mark at the head of a party column, cast a vote for all the candidates of that party, instead of choosing, out of an alphabetical list, the names of the individual candidates favored by him. This form of ballot is greatly favored by the political organizations for the reason—which constitutes the chief indictment of the method—that it tends to promote "straight" party voting and to discourage the practice of independent voting. Certain novel mechanical devices for insuring secret voting and for obviating the more serious objections to the use of the printed ballot will be described under the head of VOTING MACHINE.

The length and complexity of the official ballot, containing the names of all candidates for all the offices to be filled at a given election, has introduced a new element of confusion. To obviate this, and thus to promote more intelligent voting, a movement aiming to reduce the number of offices to be filled by election at a given time has recently gained great headway in this country. Two methods for accomplishing this purpose have found favor —the separation of national from state and of local from state and national elections by holding them at different times, and the use of the "short ballot." The latter, which involves the election of only the principal officers of the state or city, leaving the others to be appointed, involves important changes in the fundamental

law of the several states as well as the reform of the system of voting by ballot.

For a description of the process by which the state has assumed the regulation of elections, and for an exposition of the laws which have been enacted for securing the purity of the ballot, see ELECTION; ELECTORAL REFORM; CORRUPT PRACTICES; PRIMARY ELECTIONS; VOTE; VOTER; SUFFRAGE.

**BALLOT, SHORT.** See ELECTORAL REFORM.

**BALLOU,** bă-lōō′, HOSEA (1771–1852). An American clergyman and one of the founders of the Universalist denomination in this country. He was born at Richmond, N. H.; after scant schooling he began to preach in 1793, and became a pastor at Dana, Mass., in 1794, and at Barnard, Vt., in 1803. From 1807 to 1815 he was minister of the Universalist congregation at Portsmouth, N. H., and from 1817 until his death was in charge of the Second Universalist Society of Boston, Mass. In 1819 he established the *Universalist Magazine* (later called *The Trumpet*), and in 1831 the *Universalist Expositor* (later called the *Universalist Quarterly Review*). He took a most active part in formally organizing the denomination, in extending its work, and in adding to its literature. He was also known as an eloquent pulpit orator and was much in demand for special celebrations. From John Murray, the first preacher of Universalism in the United States, he differed in the entire rejection of the so-called Calvinistic theology. Chief among his publications are *Notes on the Parables* (1805), *Treatise on the Atonement* (1807), and *The Doctrine of Future Retribution* (1834). For an account of his life and doctrines consult biographies by T. Whittemore (4 vols., Boston, 1854–55), and O. F. Safford (ib., 1889). Consult also J. C. Adams, *Hosea Ballou and the Gospel Renaissance of the Nineteenth Century* (Boston and Chicago, 1903).

**BALLOU,** HOSEA (1796–1861). An American clergyman, the grand-nephew of Hosea Ballou, of Boston. He was born in Vermont; was pastor in Connecticut and Massachusetts, and in 1853 became first president of Tufts College. He was one of the editors of the *Universalist Magazine*, later published under the name of *The Trumpet*. He was the author of *Ancient History of Universalism*, and edited a translation of Sismondi's *History of the Crusades* (Boston, 1833). A *Biography of the Rev. Hosea Ballou* was written by M. M. Ballou, his son.

**BALLOU,** MATURIN MURRAY (1820–95). An American journalist, born in Boston, Mass. He founded *Gleason's Pictorial*, the first American illustrated weekly; and was successively editor of *Ballou's Pictorial*, *The Flag of Our Union*, *Ballou's Magazine*, and the Boston *Globe*, of which he was one of the founders. He published *Due West; Due South; History of Cuba* (Boston, 1854); and a *Biography of the Rev. Hosea Ballou*, his father.

**BALLOU,** WILLIAM HOSEA (1857– ). An American author, born in Hannibal, N. Y. He studied at Northwestern University and at the University of Pennsylvania, and was subsequently a member of several United States scientific surveys (1875–78). After some time spent in reform work and journalism he devoted himself to scientific and public interests and to business pursuits. Fort Worth University conferred on him the degree of Sc.D. in 1911. Besides having written many scientific articles for American magazines and foreign weeklies, he is the author of some 300 poems and also of the following novels: *A Ride on a Cyclone* (1889); *The Upper Ten* (1890); *An Automatic Wife* (1891); *Spectacular Romances* (1892); *Love on a Log and Other Stories* (1895).

**BALL'S BLUFF.** A locality on the Potomac, 33 miles northwest of Washington. Here, on Oct. 21, 1861, during the Civil War, 1900 Federal soldiers of McClellan's army, under Col. E. D. Baker, were overwhelmingly defeated by about 3000 Confederates under General Evans, the latter fighting from the shelter of a thickly wooded grove. The Federals lost about 1000 in killed, wounded, and prisoners, Colonel Baker falling during the engagement; while the Confederates lost only 150. The disaster was due to the blundering generalship of McClellan and his division commander, Stone. The latter was arrested by order of the Secretary of War and imprisoned for six months in Fort Lafayette. This arrest seems to have been unwarranted, as no charges were ever preferred against him and he was later reinstated in command. Consult Johnson and Buel (ed.), *The Battles and Leaders of the Civil War*, vol. ii (New York, 1884).

**BALLSTON SPA,** bąl'ston spä. A village, the county-seat of Saratoga Co., N. Y., 7 miles southwest of Saratoga Springs, on the Delaware and Hudson Railroad and on the Kayaderosseras River (Map: New York, G 4). It has some reputation as a summer and health resort and is widely known through its mineral springs. The water flows from a depth of 650 feet through a tube bored into the solid rock, and is highly effervescent. The village has a county courthouse, fair grounds and track, the Saratoga county almshouse and hospital, and the Spa sanitarium. The industries include a large tannery, foundries and machine shops, a shirt waist and textile factory, and pulp and paper mills. Settled in 1787, Ballston Spa was incorporated in 1807. Town meetings are held every two years and charter elections annually. The board of education, the village president, and the board of trustees are chosen by popular vote. The water works are owned and operated by the village. Pop., 1900, 3923; 1910, 4138.

**BAL'LYME'NA** (Gael. middle town). A town and important railway centre of county Antrim, Ireland, on the Braid, 33 miles northwest of Belfast (Map: Ireland, E 2). It lies in a densely populated and well-cultivated district, has agricultural and iron-mining industries, and manufactures linen, especially brown linen. Pop., 1901, 10,886; 1911, 11,381.

**BAL'LY TREE.** See BLACK BULLY.

**BALM,** bäm (for derivation, see BALSAM), *Melissa officinalis*. An erect, branching, perennial, herbaceous plant, 1 to 2 feet high, of the family Labiatæ, a native of the south of Europe, naturalized in England, and escaped from gardens in the United States. It has ovate, crenate leaves and axillary one-sided whorls of white or pale yellow flowers. The whole plant has an agreeable, lemon-like smell, on account of which it is frequently cultivated in gardens. It is a valuable honey-producing plant and is sometimes grown for bee forage. Balm is employed for making an agreeable and somewhat exhilarating beverage called balm wine. The leaves and tops are used in medicine under the name of Melissa, or balm. For medicinal use the herb should be cut before the appearance of the flowers, which begin to expand in July. It is nearly inodorous when dry. The taste is some-

what austere and slightly aromatic. Balm has scarcely any therapeutic value. The quantity of oil contained in it is not more than sufficient to communicate a pleasant flavor to the infusion, which forms an excellent drink in febrile complaints, and when taken warm tends to promote the operation of diaphoretic medicines. A variety of the common catmint (*Nepeta cataria*), with a smell like that of balm, is often mistaken for it. Moldavian balm (*Dracocephalum moldavicum*) is a native of the country from which it derives its name, and of Siberia, etc.; an annual plant, having, when fresh, a smell like that of balm, but less pleasant. It is much used in Germany for flavoring. Bastard balm (*Melittis melissophyllum*), a native of the south of England and of many parts of Europe, is a very beautiful plant, which, when dried, has a delightful fragrance and retains it long. In the United States *Collinsonia canadensis* is called horse balm, and *Monarda didyma*, bee balm. All these are of the family Labiatæ.

**BALMACEDA**, bäl'mä-sā'dä, José Manuel (1838–91). A Chilean statesman. He was born at Santiago, studied there at the Seminario Conciliat, became a leader in the Liberal Club de la Reforma, and in Congress rose to be parliamentary chief of the Progressive party. In 1882 he was appointed Minister of the Interior, and in 1885 Minister of Foreign Affairs. He was elected President in 1886, and forthwith inaugurated an era of public improvement, during which laws were liberalized, railroads were built, and the system of public education was widely extended. Nevertheless this policy eventually alienated from him all save those directly interested in office. In 1890 he was suspected of scheming to effect the election as his successor of Señor San Fuentes, a politician generally distasteful to all parties, and occasion was thus afforded for open dissatisfaction. When he had thereupon proceeded to appoint an unpopular ministry and dissolve Congress, a revolutionary junta was formed and civil war began (Jan. 7, 1891). After the utter defeat of the government troops near Valparaiso (August 7), Balmaceda sought refuge in the Argentine Legation, Santiago, where, on September 18, he committed suicide. Consult Pedro Montt, *Exposition of the Illegal Acts of ex-President Balmaceda, which Caused the Civil War in Chile* (Washington, 1891). See Chile, *History*.

**BALMAIN'**. A suburb of Sydney, Australia. See Sydney.

**BALME** (bälm), Col de (OF. neck or gorge of balsam). A mountain pass in the Alps between Mont Blanc and the group of the Dent du Midi, 7221 feet high. Through it passes the bridle path from Chamonix to Martigny. It is noted for its fine views.

**BALMES**, bäl'mĕs, sometimes written **BALMEZ**, Jaime Luciano (1810–48). A Spanish ecclesiastic, philosopher, and publicist, born at Vich, Catalonia. After studying at the University of Cervera he became a priest (1833), and passed his life in teaching, travel, and study. His fame rests upon his *El Protestantismo comparado con el Catolicismo en sus relaciones con la civilizacion europea* (6th ed., Madrid, 1875; orig. Barcelona, 2d ed., 1844–45; Eng. trans. from the French, Paris, 1842–44, London, 1849; 10th ed., Baltimore, 1868), which is a very able defense of the Roman church in reply to Guizot's *Civilization in Europe*. Other writings of his (in English translation) are *The Foundations of Religion Explained* (London, 1858) and *Letters to a Skeptic on Religious Matters* (Dublin, 1875). For his biography, consult Blanche-Raffin, *J. Balmez, sa vie et ses ouvrages* (Paris, 1849).

**BALM OF GILEAD.** See Balsam.

**BALMORAL** (bäl-mŏr'al) **CASTLE** (Gael. *baile*, dwelling, town + *morail*, majestic). A royal residence situated on the river Dee, about a mile west of Crathie in West Aberdeenshire, Scotland (Map: Scotland, E 2). The estate, purchased in 1848 by the Prince Consort and subsequently extended, now comprises 40,000 acres. In 1853–55 the old building was replaced by a handsome granite castle built in the Scottish baronial style and furnished and decorated in accordance with Highland tastes. The castle consists of two separate blocks of buildings united by wings and a massive tower; it has a straggling rather than an imposing appearance, but commands a magnificent prospect. It was the autumnal residence of Queen Victoria. The castle can be visited by special order when the royal family is not in residence.

**BALMUNG**, bäl'mung. The name of Siegfried's sword in the *Nibelungenlied*. Originally the ancestral blade of the Nibelungs, it was presented to him by the generous Shilbung and Nibelung, whom straightway he thanklessly slew.

**BALNAVES**, băl-nāv'ĕs, Henry (1512–79), of Halhill, a Scottish reformer. He was born at Kirkcaldy in Fifeshire, and educated at St. Andrews and at Cologne, where he was imbued with the teachings of Lutheranism. On his return to Scotland he studied law. James V made him a senator of the College of Justice in 1538, and when Arran took up the regency he was made Deputy Keeper of the Privy Seal (1542). In the following year he was imprisoned for a time on account of his Protestantism, which became all the more active by these attempts at repression. Suspected of complicity in Cardinal Beaton's murder, he was declared a traitor and excommunicated. He fled to the castle of St. Andrews, and when it was captured by the French was sent to France with Knox and others as a prisoner of war. Here he wrote a treatise on justification, which was published after his death by Knox, with a laudatory preface, under the title of *The Confession of Faith* (Edinburgh, 1584; reprinted, London, 1831). When Mary of Guise assumed the regency in 1556, Balnaves' forfeiture was rescinded. He returned to Scotland and took an active part in public affairs, as a commissioner to settle the Treaty of Berwick (1559–60) and to revise the Book of Discipline (1563), and as an assessor with the regent Murray to inquire into the charges against Mary in connection with Darnley's murder (1568). He died in 1579. For his biography, consult Rogers, *Three Scottish Reformers* (London, 1874).

**BAL'NIBAR'BI.** One of the countries mentioned by Swift in his *Gulliver's Travels*.

**BALNEOLOGY.** See Hydrotherapy.

**BALSA**, bäl'sä (Sp. Port. from Peruv. *balza*, a light wood, of which rafts are made). A raft or float, used originally for carrying passengers across a river or for landing in the surf. It consists of two floats—commonly made of logs from the balsa tree, the wood of which is almost as light as cork—separated a short distance from each other and held in that position by a framework. It has been used in South America for centuries: it sometimes consists, as

on the coast of Brazil, of several sharpened logs held together by slats, and, used by fishermen, is often met far out at sea. On the western coast of South America balsas are made of bullock hides sewn together over a framework to form a body of nearly circular section, pointed and turned up at the ends; two of them are joined together by a framework to which they are lashed. The balsa must be regarded as a development of the raft principle, and is analogous to the pirogue, proa, banca, catamaran, and other outrigger boats of Asia and the Pacific islands. The balsas used in the navy are composed of two floats joined by a framework, over which are laid slats about an inch apart. Each float is about 10 feet long, of oval section, but somewhat flattened on top and tapering slightly from the centre towards the ends, built up of staves and banded like a barrel. The width of naval balsas is about two-thirds the length. Larger sizes have been issued, but they are not now supplied. The "india-rubber balsa" has been used on shipboard more or less since 1837, but since the advent of collapsible boats its use has decreased. It is composed of two or more cylindrical, air-tight bags, with apparatus for inflating them, and a framework and raft body to hold them together and afford a platform for passengers or freight. It is comparatively light and portable, but takes up much deck room, and the rubber deteriorates rapidly.

**BALSAM**, bąl'sam (Lat. *balsamum*, Gk. *βάλσαμον*, *balsamon*, resin of the balsam tree, the tree itself). A name formerly comprehending many resinous substances and oils, to which important medicinal virtues were ascribed, as well as of medicines compounded of resins and oils. When the term "balsam" is now used without addition, the balsams of Peru and Tolu are generally intended. These two balsams are very similar in all their more important properties, and are both produced by trees of the genus *Myroxylon* or *Toluifera*, of the family Leguminosæ, natives of the tropical parts of America. *Myroxylon balsamum pereirœ*, which is called the quinquino, a beautiful tree, common from Peru to Mexico, is generally regarded as the species which produces the balsam of Peru; and *Myroxylon balsamum genuinum*, a very similar species, found in the forests of Tolu, the banks of the Magdalena, etc., as that which produces the balsam of Tolu; but it is doubtful if the difference is not at least as much owing to the modes of procuring and preserving the balsam; and other species of the same genus are supposed also to yield it. Both balsams have a very fragrant odor. They are used in confectionery to impart a flavor like that of vanilla; also in perfumery, and for pastilles, etc. In medicine they are administered as gentle stimulants and tonics and particularly in chronic bronchial affections. Tolu lozenges are a popular and pleasant remedy for troublesome coughs. These balsams are also used for cleansing ulcers. They contain cinnamic acid, a peculiar oily substance which has been called *cinnamein*, also known as oil of balsam of Peru, resins, benzoic acid, toluene, etc. The name "white balsam of Peru" is sometimes given to a balsamic substance which flows from the *Liquidambar styraciflua*. See LIQUIDAMBAR.

The name "balm of Gilead" is generally applied to a liquid resinous substance which has long enjoyed a very high reputation in the East, being prized not only for its fragrance, but also for the medicinal virtues which it is supposed to possess. It is the subject of several allusions in the Old Testament, which strongly indicate the prevalent opinion of its preciousness, and is celebrated by Strabo, Pliny, Diodorus Siculus, and other ancient writers as a cure for almost every disease. It is generally believed to be produced by a species of *Commiphora*—a small tree growing in Arabia and Abyssinia, and known as *Commiphora opobalsamum* or *Balsamea meccanensis*. The finest balsam, called opobalsam, or balm of Mecca, is obtained by incisions; at first turbid and white, it finally becomes of a golden-yellow color and of a consistence like honey. Inferior kinds are obtained by boiling the fruit and the wood. Balm of Gilead is irritating when applied to the skin and is believed to resemble balsam of Copaiva in its effects upon the human system.

Other substances, sometimes designated balsams and possessing a somewhat similar fragrance, are produced by different species of Burseraceæ. Among them is one called South American balm of Gilead, the product of a tree called *Protium carana*. Balsamic substances are furnished also by a number of species of Clusiaceæ—balsam of Umiri, a fragrant yellow fluid, by *Humiria floribunda*, a South American tree. Canada balsam is a kind of turpentine obtained from the balm-of-Gilead fir (*Abies balsamea*); Hungarian balsam, from the mugho or mountain pine (*Pinus pumilio* or *mughus*); and Carpathian balsam, from the stone pine (*Pinus pinea*). (See FIR and PINE.) Balsam of Copaiva is the produce of different species of *Copaifera*. (See COPAIBA.) A variety of *Populus balsamifera* is known in the United States as the balm-of-Gilead tree. Balsam apple is a name applied to the fruits of two species of *Momordica*, natives of the East Indies, but rather common in the West Indies.

**BALSAM** (*Impatiens balsamina*). An erect, semi-succulent annual, native of India, and cultivated in flower gardens for more than 300 years. It is sometimes called "touch-me-not," because of the bursting tendency of the ripened seed pods, and also "lady's slipper," referring to the shape of the flower. Many varieties have arisen through cultivation and selection. The double sorts are known as camellia-flowered varieties. The plant grows from 1 to 2½ feet high and branches freely. The flowers are axillary and vary in color from white and yellow to dark-red. The plant is of easy culture. Seed may be sown in the open, or plants started in pots and planted out after danger of frost is past.

**BALSAM APPLE.** See MOMORDICA.

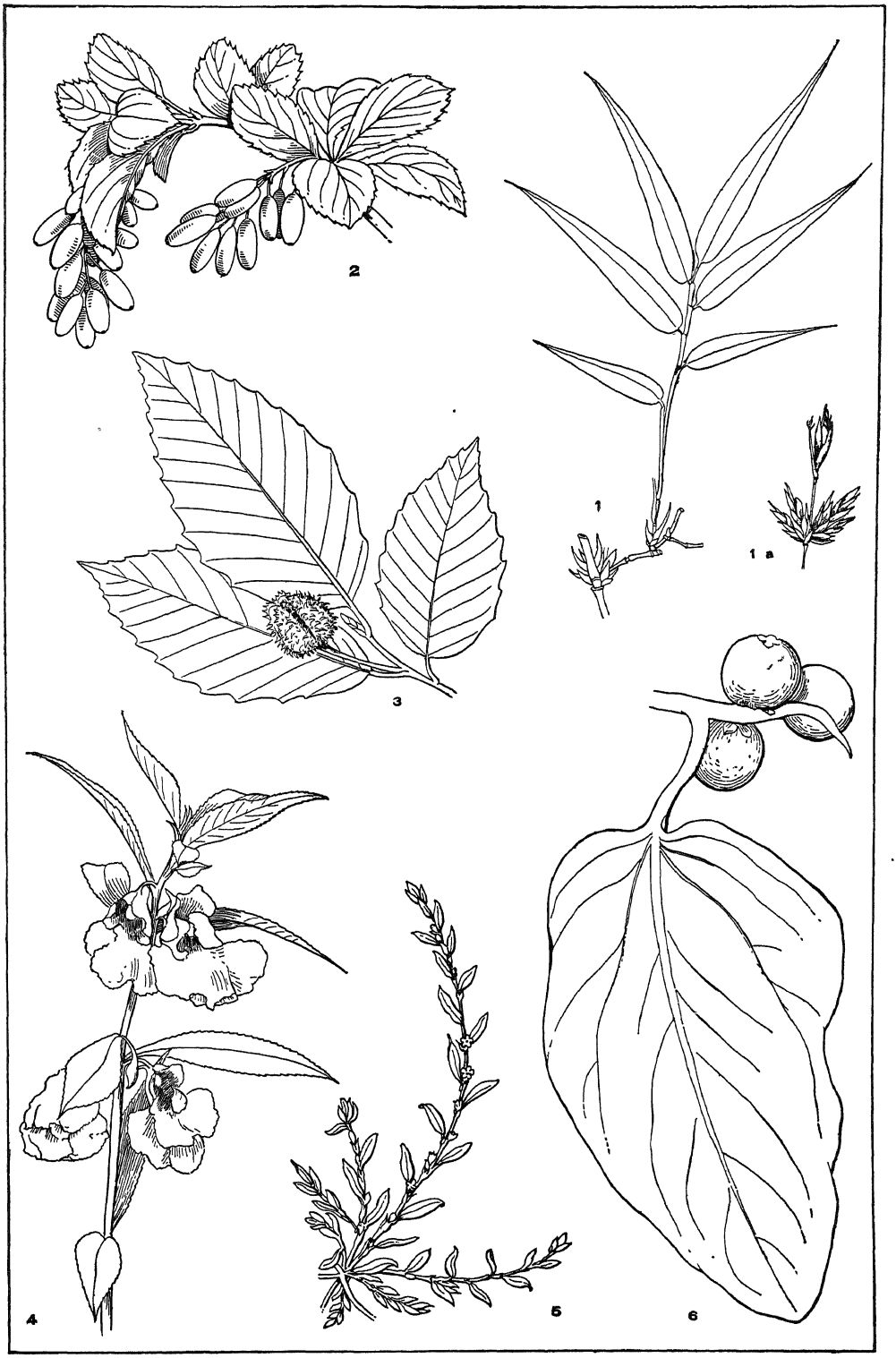
**BALSAMO**, bäl'sä-mō, JOSEPH. See CAGLIOSTRO.

**BAL'SAMODEN'DRON.** See MYRRH.

**BALTA**, bäl'tä. A town in the government of Podolia, Russia, situated on an affluent of the Bug, about 210 miles southeast of Kamenetz-Podolski, the capital of the government (Map: Russia, C 5). It is poorly built and very filthy. It is connected by rail with Odessa. The chief articles of its commerce are grain, cattle, and the manufacture of beer, tiles, and soap are among the principal industries. It holds two annual fairs. Pop., 1897, 24,400, 75 per cent of which are Jews. Formerly a Turkish possession, it was ceded to Russia by the Treaty of Jassy in 1791.

**BALTA**, José (1816–72). A Peruvian soldier and statesman, President of Peru in 1868–72,

# BALSAM, ETC.




1. BAMBOO (Bambusa vulgaris); *a*, Tip of a female flowering stalk.
2. BARBERRY (Berberis vulgaris).
3. BEECH (Fagus sylvatica).
4. BALSAM (Impatiens balsamina).
5. SMART WEED or KNOT WEED (Polygonum aviculare).
6. BANYAN (Ficus benghalensis).

born at Lima. In sundry revolutions he won military distinction, and in 1855 he withdrew from the army with the rank of colonel. In 1867 he was one of the leaders of the insurrection which drove into exile (January, 1868) the dictator Prado. In 1872 he was shot by order of the Minister of War, General Gutierrez, who had instituted a military mutiny. The populace were swift in their revenge upon both Gutierrez and his brother, who had played the assassin.

**BALTARD**, bäl'tär', LOUIS PIERRE (1764–1846). A prominent French architect and engraver. He studied in Rome (1788–91). He was professor of architecture at the Ecole Polytechnique in 1796, was architect of the Panthéon under the Empire, and supervisor of prisons and markets, 1815–18. He held, after 1818, a professorship at the Ecole des Beaux-Arts and was, after 1837, general inspector of Paris monuments. Among the buildings designed by him were the prison and arsenal at Lyons. He published several works, and was engraver for the great work on Egypt issued by order of Napoleon.

**BALTARD**, VICTOR (1805–74). Son of the above, pupil of his father in painting and architecture at the Ecole des Beaux-Arts; won Grand Prix de Rome in 1833. He is noted especially as the architect of the Halles Centrales (general market) of Paris, built between 1852 and 1859. This immense edifice of iron and glass, covering several acres and intersected by a main avenue and two cross streets, was the pioneer of all modern iron-and-glass buildings, and after 60 years of use still serves admirably its original function. Baltard was made architect of the Hôtel de Ville in Paris in 1853. In the reorganization of the corps of architects of the city of Paris in 1860 by Baron Haussmann, he was appointed director, with special charge of the Halles Centrales. He published several monumental books.

**BALTCHIK**, bäl-chēk' (probably ancient *Mclissa*). A seaport of Rumania, situated on the Black Sea, about 24 miles northeast of Varna (Map: Balkan Peninsula, G 3). It has a well-protected harbor and is the seat of a considerable trade in agricultural products. Pop., 1900, 5869; 1905, 6588; consisting chiefly of Turks, and for the rest, Bulgarians, Tatars, and Greeks. This town was bombarded by the Turks in October, 1912, and ceded by Bulgaria to Rumania in accordance with the Treaty of Bucharest of Aug. 10, 1913.

**BALTHAZAR**, bäl-thā'zēr. 1. A character in Eichberg's opera of *The Doctor of Alcantara*. 2. Belshazzar, "which that highte Balthasar," in Chaucer's *Monk's Tale*. 3. One of the Wise Men of the East. 4. The name of several minor characters in plays of Shakespeare.

**BALTIC** (bal'tik), BATTLE OF THE. See COPENHAGEN.

**BALTIC PROVINCES.** A term comprehending three Russian governments bordering on the Baltic, viz., Courland, Livonia, and Esthonia (Map: Russia, D 3). Area, 35,614 square miles. Pop., 1911, 2,687,400. The great bulk of the population consists of Letts and Esths—the former akin to the Lithuanians, the latter a Finnish race. The higher classes, nobility and burghers, are Germans, who constitute about 7½ per cent of the total population of the three governments. The number of Russians is still insignificant. The Teutonic Knights and Sword bearers subjugated the Letts in the thirteenth century, introducing German civilization and Christianity by fire and sword. The inhabitants are nearly all Protestants. Although the soil is not very fertile, agriculture is in a flourishing condition, owing to the improved methods of cultivation and a generally higher intelligence of the people. Commerce and manufactures are also highly developed, favored by the proximity of the Baltic. For further details, see articles on the separate governments.

The Baltic provinces once belonged to Sweden, except Courland, which was a dependency of Poland. The Swedish provinces came into the possession of Russia in the beginning of the eighteenth century through the conquests of Peter the Great, and Courland was acquired in 1795. Peter the Great conceded to the provinces their own administration and guaranteed the inhabitants freedom of conscience. These rights were confirmed anew in 1856, but in spite of this a systematic attempt was made by the Russian government, especially since 1880, to assimilate the provinces with the rest of the Empire. The Greek church endeavored to proselytize the people, the Russian language was substituted for the German in the schools and courts, and the press was subjected to censorship. These measures aroused great discontent in the Baltic provinces, especially among the German nobility, who, constituting but a small fraction of the population, exercise great power over the peasantry. The fall of 1905 witnessed the outbreak of a formidable revolutionary movement among the Lettish and Esthonian peasantry, directed against both the German landowners and the Russian government and partaking largely of the nature of a Jacquerie. See RUSSIA.

**BALTIC SEA.** The inclosed sea in northern Europe, bounded by Germany, Denmark, Sweden, and Russia, and communicating with the North Sea through a series of winding channels known as The Sound, Great Belt, Little Belt, Kattegat, and Skagerrak. From the peninsula of Denmark, which may be regarded as its western limit, the Baltic extends eastward to the frontier between Germany and Russia and thence northward to about lat. 66°. The greatest length of the Baltic from Lübeck in Germany to Haparanda in Sweden is about 930 miles, while its breadth varies from an extreme of 425 miles (Stockholm to St. Petersburg) to less than 50 miles at the southern extremity. It covers an area of about 160,000 square miles. The northern extension includes three large bays or gulfs, the gulfs of Riga and Finland, indenting the coast of Russia, and the Gulf of Bothnia between Russia and Sweden. On the coast of Germany are smaller indentations, including the bays of Pomerania, Lübeck, and Kiel, and the Gulf of Danzig. The principal islands are Rügen, Bornholm, Oland, Gottland, Osel, Dagö, and the Åland and Danish groups. The depression occupied by the Baltic is generally shallow; on the Stolpe Bank, off Stolpmünde in Germany, the depth is less than 40 feet, and over considerable areas it does not exceed 120 feet. Like the North Sea, the greatest depths are found in the northern part, the extreme being 1542 feet (south of Stockholm). The Baltic receives the drainage of a large part of northern Europe, including western Russia, northeastern Germany, and nearly the whole of Sweden. Owing to this drainage and to the restricted channel to the North Sea, the surface water of the Baltic contains only a third as great a percentage of salt as the Atlantic, and the saltness shows a ten-

dency to decrease towards the west and north. Tidal action is apparent only on the southern coasts, but there are surface currents of a low degree of salinity which flow constantly from the Baltic to the North Sea, while deeper currents, whose waters contain a larger content of salt, flow in the opposite direction. Storms are frequent and often cause severe losses to shipping. Easterly winds are particularly dangerous, as they drive the water before them in the form of huge tidal waves. Navigation in the northern part is suspended by ice during the winter season and early spring. The Baltic is of great commercial importance to northern Europe; the most important ports are Copenhagen, in Denmark; Kiel, Lübeck, Stettin, Danzig, and Königsberg, in Germany; Riga, Reval, St. Petersburg, Cronstadt, Helsingfors, and Åbo, in Russia; and Stockholm, Karlskrona, and Malmö, in Sweden. The Baltic is connected with the North Sea by an artificial waterway, the Kaiser Wilhelm Canal, 61.3 miles in length, which was completed in 1895. The canal contains no locks and is of sufficient depth to permit the passage of deep-sea ships. More than 40,000 vessels with a tonnage of 7,000,000 pass over its waters annually.

**BALTIMORE**, bąl'tĭ-mōr. The metropolis of Maryland, and the seventh city in point of population in the United States. It is situated on the Patapsco River, at the head of tide water and navigation, about 14 miles from Chesapeake Bay (Map: Maryland, L 3). The city extends about 6¼ miles from east to west, and between 4½ to 5½ miles from north to south, covering an area of 31½ square miles, or 20,254 acres.

**Physical Characteristics.** Baltimore is situated, in common with other great centres of the Atlantic border, at the junction of the plateau of old crystalline rocks and the overlying beds of younger and still unconsolidated formations, which stretch out towards the east. The hills within the city are composed of younger sands and gravels, which are cut through by such streams as Herring's Run, Jones's and Gwynn's Falls, and the Patapsco River. The climate of the city is temperate and bracing, removed alike from the bitter cold and enervating heat of more extreme localities.

Baltimore is roughly divided into two nearly equal parts by a small stream—Jones's Falls—which rises 20 miles to the north and flows through the city. The area of this stream is being converted into a highway, to be known as the Fallsway, of a minimum width of 75 feet, running diagonally across the city from the docks to the railroad terminals. The stream flows through the sewer pipes, above which there has been constructed a system of concrete arches, which are in turn covered by a pavement of stone blocks. The portion of the city northeast of the stream, of which Fells's Point and Canton, with wharves, factories, and canneries lining the water's edge, are respectively the south and southeast ends, is still denominated "Old Town." The southeastern section is occupied largely by immigrants and presents the ordinary characteristics of a seaboard city. To the north, east, and northeast stretches the residential quarter of the city's breadwinners. Of the section southwest of the Falls, Locust Point is an irregular strip extending to the southeast, with numerous wharves, railroad terminals, and grain elevators, and tipped at the very extremity by Fort McHenry. The southwestern corner is Spring Garden. The wholesale business section extends north from Pratt Street, the extreme northern limit of the harbor, and is bounded by Paca, Baltimore, and Light streets. A little beyond is Baltimore Street, the chief latitudinal thoroughfare. Farther on, widening out to the west, lies the retail shopping district, while beyond, extending halfway to the northern limits, is the fashionable residential quarter. The northern and northwestern sections are substantial-dwelling districts, fringing out to modest but comfortable artisans' homes. Houses are numbered in the decimal plan, running north and south from Baltimore Street, and east and west from Charles Street.

**Monuments and Buildings.** Baltimore is called the Monumental City, a title derived less from the number of its stone memorials than from the early date at which Washington Monument, in Mount Vernon Place—a noble marble shaft rising 164 feet, surmounted by a heroic figure of Washington—and Battle Monument, in Monument Square, were erected. Mount Vernon Place contains several bronzes by Barye and one by Dubois, the Rhinehart monument of Chief Justice Taney, and the Story replica of the George Peabody monument. Other monuments of interest are the Wells and McComas, the Armistead, the William Wallace, the Wildey, the Howard, the Confederate, the Ridgely, the Francis Scott Key, and the Soldiers' and Sailors' monuments.

The characteristic of Baltimore architecture is solidity and convenience. The public buildings of special interest are the city hall, the post office, the custom house, the city jail, the Peabody Institute, the Johns Hopkins Hospital, the Enoch Pratt Free Library, the Masonic Temple, and, most beautiful of all, the courthouse, of white marble, in classic Renaissance style, with interesting mural paintings by Blashfield and Turner, and a bust of Severn Teackle Wallis, the distinguished Maryland jurist and man of letters. The city boasts many large and beautiful apartment houses, such as the Marlborough, Washington, Esplanade, Homewood, and Algonquin. The Continental, Equitable, American, Baltimore and Ohio, and Fidelity buildings are imposing office structures. The important clubs of the city are the Maryland, occupying a beautiful Romanesque edifice of white marble; Baltimore, Athenæum, University, Phœnix, and Country (Roland Park). The Stafford, Rennert, Howard, Caswell, Eutaw, Emerson, Kernan, and Belvedere are the principal hotels. A United States Subtreasury is located here.

**Parks and Squares.** The public parks and squares of Baltimore are beautiful and well distributed. The more important are Druid Hill (674 acres), Gwynn's Falls (375 acres), Clifton (267 acres), Wyman (198 acres), Carroll (177 acres), Patterson (128 acres), Herring Run (154 acres), Riverside (17 acres), Latrobe (14 acres), Swann (11 acres), and Federal Hill (8 acres). Druid Hill may be reasonably described as one of the finest parks in the United States. It abounds in natural beauties which have been carefully preserved and emphasized. Druid Lake, an artificial basin, is part of the municipal water-works system. Carroll Park contains the historic Carroll mansion. Clifton Park was purchased from the Johns Hopkins University. Wyman Park, and a tract which will probably be called University Park, situated adjacent to

Homewood (the suburban site of the Johns Hopkins University), on Charles Street, bid fair to rank among the most attractive parks of the city. Under an adopted plan prepared by Frederick Law Olmsted, the city has undertaken a definite extension of its systems of parks and squares.

**Suburbs.** Baltimore's suburban growth has been very rapid. Suburbs extend north and northwest of the city proper for about 10 miles and are made accessible by electric car lines. It is estimated that these suburbs have (in 1913) a population of 100,000. Among the more important are Arlington, Mount Washington, Roland Park, Walbrook, Forest Park, and Catonsville.

**Cemeteries.** Greenmount Cemetery (containing the graves of many illustrious men, including those of John McDonogh, Johns Hopkins, and Sidney Lanier), Loudon Park, and the National Cemetery are the most important burial places. Westminster, one of the oldest and smallest churchyards in the city, contains the grave of Edgar Allan Poe.

**Educational Institutions.** Baltimore ranks as one of the foremost educational influences of the country. A graded system of public schools provides free instruction in kindergarten, primary, secondary, collegiate, and normal studies, and in manual training. The system comprises 161 schools, employing 1850 teachers, with a total enrollment of 79,000 pupils and an average attendance of 62,000; including both elementary and secondary schools. Baltimore is the seat of the Johns Hopkins University (q.v.), opened for instruction in 1876. Other institutions of learning are St. Mary's Seminary of St. Sulpice, Loyola College, Goucher College, Morgan College (colored), and St. Joseph's Seminary (colored). Among the professional schools are the law and medical departments of the University of Maryland, College of Physicians and Surgeons, Maryland College of Pharmacy, and Baltimore College of Dental Surgery. The last named, founded in 1839, is the oldest dental college in the world. Other schools and academies are McDonogh School, Bryn Mawr School, Calvert Institute, Academy of the Visitation, Notre Dame of Maryland, and Mount de Sales Academy.

The Peabody Institute, endowed by George Peabody, who laid the foundation of his great fortune in Baltimore and entertained a strong friendship for its people, contains a valuable library of 180,000 books, 28,000 pamphlets, and 1400 maps, an interesting art gallery, and a well-organized conservatory of music. The art galleries of Mr. Henry Walters contain one of the choicest private collections in the United States, and are opened to the public at certain seasons for the benefit of a local charity. The Maryland Historical Society has a valuable collection of books, pamphlets, and manuscripts, and an art gallery. The Maryland Academy of Sciences possesses interesting natural-history collections. The Maryland Institute includes a school of art and design and a library.

The libraries of the city, in addition to those connected with the several institutions enumerated above, are the Enoch Pratt Free Library, containing more than 306,000 volumes, with branch libraries in various parts of the city; the Baltimore Bar Library, the Maryland Diocesan Library, the Medical and Chirurgical Faculty Library, and the New Mercantile Library.

**Charitable Institutions.** Among the important charitable institutions of the city, supported by endowment, private contribution, or public aid, are the Johns Hopkins Hospital, in construction and equipment one of the finest in the world; Sheppard-Pratt Insane Asylum, Maryland University Hospital, Union Protestant Infirmary, City Hospital, Maryland General Hospital, St. Joseph's Hospital, Church Home and Infirmary, Hospital for the Women of Maryland, Jewish Home for Consumptives, Eudowood Tuberculosis Sanitarium, Hebrew Hospital and Asylum, Baltimore Orphan Asylum, Thomas Wilson Sanitarium, St. Vincent's Infant Asylum, Nursery and Child's Hospital, Hebrew Orphan Asylum, Bay View Asylum (the city almshouse), House of Refuge, Maryland Hospital for Insane, Mount Hope Retreat. Numerous other sectarian and non-sectarian institutions provide for the relief of the sick, needy, and the infirm. A Pasteur Institute (city) is in successful operation.

**Churches.** The first Methodist Episcopal church in the United States was founded in Baltimore. The city is also the seat of a Protestant Episcopal bishop and of a Roman Catholic archbishop (Cardinal Gibbons), whose diocese is the first in the United States. Important Roman Catholic church assemblages have been held here from time to time, one of the most interesting being the Third Plenary Council in 1885.

The city abounds in noteworthy ecclesiastical structures. The Roman Catholic Cathedral, built in the early part of the nineteenth century, is remarkable for the chaste simplicity of its design and proportion of its parts. Of more recent construction are Grace Episcopal Church, First Methodist Episcopal Church, First Independent Christ's Church, First Presbyterian Church, First Baptist Church, Associate Reformed Church, Vernon Place Methodist Episcopal Church, and the Eutaw Place, Madison Avenue, and Bolton Street synagogues.

**Trade and Industry.** Natural geographical situation, favorable trade connections, and unusual harbor facilities constitute Baltimore's chief commercial advantages. At the entrance to the harbor the Patapsco River divides into the northwest, southwest, and middle branches. The northwest pierces 2½ miles into the very heart of the business portion of the city. The southwest and middle branches envelop the southern and southwestern sections, giving a long expanse of water front in close proximity to the lines of the Baltimore and Ohio and the Wabash railroads. The main harbor, or that on the northwestern branch, has a water front, measured on the pier head line, of 6½ miles, an area of 630 acres, and while leaving ample fairways for the movement of vessels, furnishes 96 acres of anchorage grounds, on which the least depth of water is 19 feet. The whole of the lower portion of the harbor, covering the elevators and steamship piers, has a depth of 27 feet at mean low water. The harbor along the southwest and middle branches has, within the city limits, and measured on the pier-head line, a water front of 5½ miles, and nearly as much more on the opposite banks in the county. It covers an area of 1300 acres, and has channels of 24 feet depth at mean low water. The municipal pier system has been adopted. This favorable geographical situation has been emphasized and developed by the establishment of direct lines of communication. The Baltimore and Ohio Railroad reaches in one direction to Philadelphia, thence by direct connection to New

York, and on the other hand penetrates to the west, southwest, and northwest to the waters of the Mississippi. The Northern Central Railroad serves to connect Baltimore with the great Pennsylvania system, and affords a direct outlet to the north. Two associated branches of the Pennsylvania system are the Baltimore and Potomac to Washington, and the Philadelphia, Wilmington and Baltimore to Philadelphia and the north and east. The Western Maryland Railroad, constructed largely through municipal aid, and extending in one direction through the fertile valley of the Shenandoah and in another into the rich Cumberland Valley, has been acquired by the extensive Wabash system; and in July, 1912, a new trunk line connecting Baltimore and the Atlantic seaboard with Pittsburgh and the West was inaugurated by way of the new Western Maryland extension.

Regular communication between Baltimore and foreign ports is afforded by the North German Lloyd to Bremen, the Neptune line to Rotterdam, the Atlantic Transport line to London, and a number of other lines offering frequent service. The city is the largest corn-exporting port in the United States. Other important articles of local export are wheat, flour, cotton, tobacco, copper, and coal. Importing activity centres about iron ore, bananas, pineapples, coconuts, sugar, and general merchandise. In 1910 Baltimore ranked fourth among all the seaports of the United States in the value of exports and sixth in the value of imports.

The manufacturing enterprises of Baltimore are most varied, scarcely a single important industry being unrepresented. It is the largest manufacturing centre in the United States for fertilizers, straw goods, cotton duck, fruit canning, and oyster packing. It has the largest copper-refining plant in America. In the total value of its manufactured products Baltimore stood in 1909 thirteenth among the cities of the United States. The shipbuilding industry has recently undergone marked development. Sparrow's Point, with its great steel plant, Curtis Bay, Locust Point, and Woodberry are busy industrial centres.

The closer proximity of Baltimore, by several hundred miles, to the great cotton belt of the South, to the grain-growing sections of the West, and to the wood, coal, and iron wealth of the interior, affords cheap and easy access to the raw materials of industry. It is believed that Baltimore's location in the middle of the Atlantic coast and its facilities for collecting and distributing from and to the inland will throw to the port a large proportion of the trade that will pass through the Panama Canal. The proximity of a rich and productive country, the low cost of water transportation, and the economy of domestic distribution through municipal markets render the cost of living in Baltimore much less than in many smaller cities.

**Municipal Government.** The original municipal charter, granted in 1796 and repeatedly amended and modified, was replaced in 1898 by a modern reform instrument of government. Under its provisions the government of the city is vested in a mayor, who holds office for four years, a bicameral city council, and various administrative departments, boards, and commissions. The municipal officials, with the exception of the city register and printer (elected by the city council), and the comptroller, surveyor, and president of the second branch of the city council (elected by popular vote), are appointed by the mayor, with the consent of the higher branch of the city council. The mayor, comptroller, city engineer, city solicitor, and president of the higher branch of the city council constitute a board of estimates, exercising essential control of municipal finances. The board of awards is of similar composition, with the register substituted for the city engineer. The mayor, comptroller, register, and two other persons appointed by the mayor serve as commissioners of finance in the administration of the municipal debt.

Baltimore spends annually, in maintenance and operation, about $22,000,000, the principal items of expense being: police department, $1,270,000; charity and corrections, $530,000; street lighting, $391,000; fire department, $1,100,000; parks and squares, $522,000; schools, $2,500,000; sewers and sewerage disposal, $2,500,000; interest on debt, $2,450,000. The water works, representing a total construction expenditure of nearly $20,000,000, are owned and operated by the city. The entire system now includes some 732 miles of mains, two standpipes, eight storage reservoirs and two impounding reservoirs. The city has a gross bonded debt of about $75,000,000, and the assessed valuation of property, real, personal, and corporate, is $782,000,000. The city parks are maintained by a franchise tax upon the receipts of the street railways.

**Population.** The thirteenth census (1910) of the United States gave the total population of Baltimore as 558,485, divided into 118,851 families, occupying 101,905 dwellings. Of this number 268,195 were males and 290,290 were females; 481,442 were native born and 77,043 were foreign born. The total number of whites was 473,387 and of colored 85,098. Of the native whites 261,474 had native parents and 134,870 had foreign parents. The total illiterate population 10 years old and over was 20,325, of whom 10,887 were white and 9438 were colored; 1920, 733,826.

**History.** The foundation of Baltimore is associated with the emergence of the proprietary government of Maryland from an era of troublous times towards the close of the first quarter of the eighteenth century. With the expansion of commerce and the increase of population, it was not long before the need of a port near the head of Chesapeake Bay began to be felt. Attention was directed to a remarkable site on the north side of the Patapsco River, 14 miles from the waters of the bay, offering easy access and safe harbor to vessels of large size. On July 14, 1729, a petition was presented to the Provincial Assembly praying for the erection of a town at this point, and three weeks later a bill to this effect was passed.

Baltimore slowly but surely forged ahead of older towns in trade. The history of the city immediately before and during the Revolutionary War forms a familiar chapter in our national history. From Baltimore largely came the zeal and energy with which Maryland entered into the War of Independence. The events of the war interrupted foreign commerce and cut off all continental supplies; but it stimulated local manufactures and shipping thereafter. Local merchants engaged extensively in the world's carrying trade, and "Baltimore clippers" became famous. During the War of 1812 the city was attacked by land and water, but successfully defended in each case. During the bombardment

of Fort McHenry, Francis Scott Key, while detained on board a British vessel, composed the national anthem, "The Star-Spangled Banner." The introduction of new industrial methods succeeded the reactionary depression following the War of 1812. The Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad were projected and carried forward by local enterprise. The first telegraph line in the United States was constructed between Washington and Baltimore. Industry, trade, and commerce suffered heavily from the events of the Civil War. Communication with the South was completely cut off, and western trade diverted to other channels. A mob attack upon a Massachusetts regiment in its passage through the city, on April 19, 1861, inflamed the country and led to the Federal occupation of the city. But the causes of prosperity were suspended, not destroyed, and as the prostrate industrial life of the tributary territory revived, the city emerged into new importance as an industrial centre. In 1888 a large area or "belt" of suburban territory was annexed to the corporate limits. On Feb. 7, 1904, a conflagration wiped out the business centre of the city. The fire burned 30 hours and spread over the territory bounded by Fayette, Charles, Baltimore, Liberty, and Lombard streets, the water front, and Jones' Falls. The loss was estimated at $125,000,000. Within three years the burnt area was completely rehabilitated. The fire has since been considered a blessing in disguise because of the spirit of progress which it awakened. The diversification of manufactures, the growth of commerce, extension of trade, increase of population, the influx of foreign elements, the rise of economic standards, the development of civic consciousness have been the essential elements in the later history of Baltimore.

Consult: Scharf, *The Chronicles of Baltimore* (Baltimore, 1874); Thomas, *The City Government of Baltimore* (ib., 1889); Hollander, *Guide to the City of Baltimore* (ib., 1893); Love, *Baltimore: The Old Town and the Modern City* (ib., 1895); Hollander, *The Financial History of Baltimore* (ib., 1899); and Coyle, *The Baltimore Book* (ib., 1912).

**BALTIMORE,** BARONS OF, or LORDS BALTIMORE. The title of the Calvert family in the Irish peerage. SIR GEORGE CALVERT, first Lord (c.1580–1632). A British statesman. He was born at Kipling, Yorkshire, and graduated at Oxford in 1597. He then became secretary to Sir Robert Cecil and won the esteem of James I, who knighted him in 1617 and made him Secretary of State in 1619. In 1621 and again in 1624 he sat in the House of Commons; but becoming a Catholic shortly afterward, he resigned, only to be raised to the Irish peerage by the favor of the King as Baron of Baltimore. He early became interested in the colonization of the New World and in 1621 dispatched a ship to Newfoundland to establish a settlement. In 1623 he obtained a charter to found a colony there under the name of the Province of Avalon. He crossed the ocean himself in 1627 and again in 1629, taking his family with him, but encountered many difficulties from the hostility of the French and the severity of the climate and soon applied for a grant of land in a more genial region. Although the King had tried to dissuade him from his project, he finally obtained (in 1632) a grant of the territory which was called "Maryland" by Charles I in honor of the Queen. Before the charter was issued, Sir George died, and the grant devolved upon his son Cecil, who thus became the real founder of Maryland, although he never visited the Colony. He sent settlers, however, under his younger brother, Leonard (see CALVERT, LEONARD), who was the first Governor of Maryland (1634–47). The successive Barons of Baltimore, or Lords Baltimore, were: GEORGE (first), CECIL (second), CHARLES (third), BENEDICT (fourth), CHARLES (fifth), and FREDERICK (sixth). The house became extinct with the last, who died without leaving legitimate issue. All of them were prominently identified with the history of Maryland.

Consult: W. H. Browne, *George Calvert and Cecilius Calvert, Barons of Baltimore* (New York, 1890); L. W. Wilhelm, *Life of George Calvert* (1884), one of the Maryland Historical Society's monographs; J. P. Kennedy, *Discourse on the Life and Character of George Calvert, Lord Baltimore* (Baltimore, 1845); C. H. Firth, article in *Dict. of Nat. Biog.*, and references there cited, C. C. Hall, *The Lords Baltimore and the Maryland Palatinate* (Baltimore, 1905).

**BALTIMORE ORIOLE.** See ORIOLE.

**BALTINGS,** bäl'tĭngz. The royal family from which the Visigoths chose their kings.

**BALTISTAN,** bäl'tê-stän' (Pers. *stan*, district, region; of the Baltis), or LITTLE TIBET. A province of Kashmir, a native state, India, on the south of the Mustagh and north of the Kashmir province (Map: India, C 1). It is situated in the midst of enormous mountain ranges with peaks of 25,000 and 26,000 feet, and one over 28,000 feet, and glaciers which are the largest known out of polar regions. The area is estimated at about 13,000 square miles, and the population at about 60,000. The people are essentially Mongolian and in large part profess Mohammedanism. Their language is a Tibetan dialect. Cultivation of the soil is dependent on irrigation, and life presents many hardships. The cold is often intense, and the country is almost without forests. Independent rule in Baltistan, by the rajas or gialpos, came to an end in 1840. Years of oppression followed, but the country, now under the administration of the Wazit Wazarat of Ladakh and the protection of the government of India, may look for better days.

**BALTZER,** bälts'ĕr, JOHANN BAPTISTA (1803–71). A German theologian. He was born at Andernach, studied at Bonn, and after his ordination to the priesthood in 1829, was made professor of theology at Breslau in the following year. He was at first an enthusiastic follower of Georg Hermes in his attempt to reconcile the newer German philosophy with the Roman Catholic teaching, but definitely broke with his school in 1839 and associated himself with the speculations of Anton Günther. After the papal condemnation of the latter's teachings Baltzer submitted indeed, but his independent spirit led him into further difficulties, and he was suspended in 1862. As in natural sequence he was a strenuous opponent of the definition of papal infallibility and was a promoter of the Old-Catholic movement in Silesia. He published *Die biblische Schöpfungsgeschichte* (2 vols., 1867–73), and *Ueber die Anfänge der Organismen* (4th ed., 1869). For his life, consult: Friedberg (Leipzig, 1873), and Melzer (Bonn, 1877), both favoring Baltzer's attitude, and Franz (Berlin, 1873), representing the other side.

**BALTZER,** WILHELM EDUARD (1814–87). A German theologian and leader of the movement known as the *Freie Gemeinden,* or free religious communities which have sprung up since the middle of the nineteenth century in opposition to dogmatic and traditional theology. He was born at Hohenleine, studied at Leipzig and Halle, and entered the Lutheran ministry, but on account of the liberal views which, following Delitzsch, he had adopted, was not looked upon with favor. Consequently, in 1847, he founded a "free church" of his own and presided over a convention of similar organization at Nordhausen in the same year. Until 1881 he continued to be a representative leader among them, but lived in retirement at Grotzingen for the last few years of his life, partly occupied in the promotion of vegetarianism, for which he founded an association and an annual publication. His writings were mainly devoted to the propagation of his views; among them are *Alte und neue Weltanschauung* (4 vols., 1850–59); *Gott, Welt und Mensch* (1869); *Vegetarisches Kochbuch* (14th ed., 1900).

**BALU,** bä'lōō (native name). A variegated wild cat of Sumatra, probably a variety of *Felis aurata.*

**BA-LUBA,** bȧ-lōō'bȧ. A Negroid people of the middle Kasai Basin, Belgian Congo. They are intelligent, adaptive, industrious, and skilled in the arts; travelers praise the good qualities of this powerful people.

**BALUCHI,** bȧ-lōō'chē, or **BELOOCHE.** A modern Iranian dialect, with many foreign loanwords from the Persian, Arabic, Turkish, and Sindhi. The Baluchi is divided into two main dialects, one of which, the southern or Makrani, has preserved many of the older features of the language with less change than is the case with the northern Baluchi, which, however, possesses the better-known literature. The Baluchi is far inferior to the Afghan (q.v.) in literary development. On the other hand, it represents in its consonantal system by far the oldest stage of any of the modern Iranian dialects, being in this regard on the same level as the Middle Persian or Pahlavi (q.v.). Thus the Persian changes *rd, rz* to *l,* while Baluchi preserves the original sounds: Persian *dil* (heart), Baluchi *zirdē* (cf. Russian *serdtse,* Lat. *cordis*); original *dj* is preserved, whereas it becomes *z* in Persian: Bal. *djan* (wife) = Pers. *zan.* Baluchi is seen to be equally conservative in that it does not change, as does the Persian, medial and final surds to sonants: Bal. *šap* (night) = Pers. *šab,* etc. The ruling race of Baluchistan, the Brahui (q.v.) speak a language which is entirely different from the Baluchi, being of Dravidian origin. Consult: Geiger, "Sprache der Balutschen," in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1898), and the literature there cited. Longworth-Dames, *Popular Poetry of the Baloches* (Folklore Soc. publications, London, 1907).

**BALUCHISTAN,** bȧ-lōō'chȧ-stän', or **BELUCHISTAN,** bē-lōō'- (Pers. *stan,* district, region, of the Baluchis). A British dependency in Asia, bounded by Afghanistan, on the north, Sindh (British India) on the east, the Arabian Sea on the south, and Persia on the west (Map: Asia, Central, K 6). It extends from lat. 25° to 32° N., and from long. 61° to about 70° 30' E., and covers an estimated area of 134,650 square miles, including the territory directly or indirectly held by Great Britain.

**Description.** The general appearance of the surface is rugged and uninviting. The chief mountain ranges enter from Afghanistan, through the northeastern end, and branch out towards the south and the west. Parallel to the eastern frontier runs the Kirthar Range, terminating at Cape Monzen, on the Arabian Sea. The level country found mainly in the northwest consists of stony plains. The highest peaks have an altitude ranging from 10,000 to 12,000 feet. The coast line, having a total length of about 600 miles, is mostly elevated and very little indented. It is without any harbors, but has a few roadsteads, the most important of which are Ormarah and Gwadur. The rivers of Baluchistan are generally short and flow in a direction from north to south. Very few of them, however, reach the coast, as their scanty waters are either diverted for irrigation purposes or are absorbed by the sandy soil. The chief of them are the Bolan and the Mula in the north, the Purali and the Hingol in the south, the latter entering the sea, and the Dasht at the southwestern end, also discharging into the Arabian Sea. The climate varies greatly with the formation of the surface. The winters are generally severe, and snow is found even in the valleys. The summers are excessively hot, especially on the coast.

**Industries.** The cultivable area in comparison with the total area is small; for, excepting the plains of Kachhi, Las Bela, and the Dasht in Makran, cultivation is confined to limited areas in the middle of the valleys between the mountains. Grains, cotton, indigo, and all kinds of southern fruit are cultivated in several parts of the country, and the date palm grows in abundance in Makran. Land available for grazing purposes is found in some localities, and camels, sheep, and horses are reared. The mineral deposits are numerous and include gold, silver, copper, iron, zinc, saltpetre, and different kinds of salts. Manufacturing industries are practically non-existent; the principal products are rough blankets. The chief exports are wool, hides, dried fruit, madder, and tobacco. Transportation is effected chiefly by camels and the Sindh-Pishin Railway. There are about 550 miles of railway, and more are under construction. The town of Quetta in northwest Baluchistan is one of its important centres and is fast acquiring prominence as the western terminus of the Indian railway system.

**Government, etc.** Baluchistan consists of British Baluchistan (districts and administered territories), administered by a chief commissioner under the Governor-General of India; the native state of Khelat, governed by a khan under the control of a British political agent; the native state of Las Bela, governed by a jam, who is also controlled by the political agent; and tribal areas. British territory consists of the districts of Quetta Pishin, Loralai, Zhob, Bolan, Chagai, and Sibi; capital, Quetta; area, 46,960 square miles; pop. (1911), 414,412. The area of Khelat is stated at 73,278 square miles; capital, Khelat. Las Bela has 7132 square miles, and the tribal areas 7268 square miles. The total area of the native states is therefore 87,678 square miles; pop. (1911), 396,432; total Baluchistan, 134,638 square miles; pop., 810,844 (of whom 758,761 are Mohammedan). The two principal tribes are the Baluchis and the Brahuis.

**Ethnography.** The Baluchis, or Biloch, after

whom Baluchistan is named, are, like the Afghans, an Aryan people, with Indic and Iranic linguistic affinities, perhaps more of the latter. Some Arab, Turk, and Negro blood also exists in some of the Baluchis. They are physically above the average, largely nomadic, and present some of the best and some of the worst characteristics of partly civilized races. In physical constitution, dress, and mental disposition they are distinguished from the Brahuis, who seem to have come earlier into the country. Both peoples are followers of Islam, professing the Sunnite creed, and the various tribes still lead a semi-independent life. Less important peoples in Baluchistan are the Persian Dehwars, or "villagers," the Gypsy-like Luris, and the Mekranis of the coast, who are considerably mixed in race. For more recent information consult Oliver, *Across the Border, Pathan and Biloch* (London, 1890), Dames, *Popular Poetry of the Baloches* (London, 1907), and other works.

**History.** Baluchistan, which is first mentioned by the historians of Alexander the Great under the name of Gedrosia, was ruled from early times to the end of the seventeenth century by a line of Hindu princes. Hard pressed by the mountain tribes of the interior, the Hindu rulers summoned to their aid the Brahuis, under their leader Kumbar, who subdued the predatory tribes and then made themselves masters of the country. The descendants of Kumbar established themselves firmly in power and were confirmed in their authority by the celebrated Nadir Shah, ruler of Persia, who overran the region on his expedition into India in 1739. Under the energetic Nasir Khan (1739–95), the supremacy of the Khan of Khelat was successfully asserted over the numerous tribal chiefs. British influence in Baluchistan dates from 1839, when, in reprisal for the khan's hostile conduct, Khelat was stormed by General Willshire. By a treaty of alliance concluded between Nasir Khan II and Great Britain in 1854, that ruler, in return for an annual subsidy of 50,000 rupees, later increased to 100,000, conceded to the British the right of armed intervention in any part of his territory—an exercise of power which the British government carried to the extent of forcing the resignation of the ruler of Khelat, Mir Mahmud Khan, in 1893. Since that date Baluchistan has come more and more under British influence, a large section of the country being now under the direct control of a British agency. Consult: Macgregor, *Wanderings in Balochistan* (London, 1882); Möckler, "Origin of the Baloch," in *Asiatic Journal* (Calcutta, 1896); Noetling, "Ueber prähistorische Niederlassungen in Baluchistan," in *Zeitschrift für Anthropologie und Ethnologie* (Berlin, 1899); Bellew, *Races of Afghanistan* (London, 1880). Consult also the *Proceedings* of the Royal Geographical and the Royal Asiatic societies.

**BALUCKI,** bȧ-lōōts'kē, MICHAL (1837–1901). A popular Polish novelist and playwright. Born at Cracow, he studied at its gymnasium and university, being graduated from the latter in 1861. While still at the university he attracted considerable attention by his verse and prose, and a year after graduation his literary career may be said to have begun. It continued uninterrupted for nearly 40 years, save for a twelvemonth spent in prison for participation in the Polish Revolution of 1863. On his release he published, under the pseudonym of Elpidon, his first novel, *The Awakening* (1863). This, like most of his novels and comedies, satirized the manners and customs of the time in Poland. It was followed by three frank comedies in similar vein: *The Young and the Old* (1866), *The Counselor's Advisers* (1887), and *Hunting a Husband* (1869). Then came a number of novels, among which were *Dazzling Poverty* (1870), *The Jewess* (1871), *Sabina* (1871), *From Camp to Camp* (1872), *The Parson's Niece* (1872), and *The White Negro* (1875). *A Romance without Love* (1870) is one of his most popular novels. Among his other comedies the best known are *The Emancipated* (1873), *Gilded Youth* (1876), *The Amateur Theatre* (1879), *The Town Council* (1880), *The Open House* (1883), *Miss Valerie* (1891), *The Flirt* (1893), and *The Burgomaster of Pipidowka* (1894). Besides these and other of his longer works, Balucki wrote numerous short stories and essays on literary, historical, and dramatic subjects. The distinguishing characteristics of his creative writing are a strong democrative tendency and a persistent scorn of the prejudices and other shortcomings of society. Yet the author's brilliant style and unforced humor have not only saved him from offending his readers, but have actually aided in conveying the much-needed lessons. In this way his influence on Polish readers has been very great, as great perhaps as Gogol's in Russia and Dickens's in England. Owing to his distinctly national appeal, his works have not yet been translated into either French or English, although two or more have been rendered in German.

**BALUGA,** bȧ-lōō'-gȧ. Name applied to the Negrito mixed-bloods of Central Luzon, Philippine Islands.

**BAL'USTER,** popularly **BAN'ISTER** or **BAL'LASTER** (Fr. *balustre*, It. *balaustro*, through Lat. *balaustium*, from Gk. *βαλαύστιον*, *balaustion*, flower of wild pomegranate tree; so named from its shape). The name given to small shafts or pillars set in a line at short equal distances, and supporting a capstone or handrail. Though balusters were represented in Assyrian bas-reliefs, they seem to have been entirely unknown in classic architecture. Their artistic development came with the Renaissance. The earliest type resembled miniature pillars; then came a type consisting of two short candelabrum-shafts or slender vase-like forms, connected by a scotia and moldings, the lower "vase" being inverted; and finally (c.1540) the baluster with a single vase or pear-shaped swelling with well-defined base and cap. Modern balusters of wood for interior use are often slender spindles, sometimes (since 1750) spirally twisted. Metal balusters of very varied forms are often used. See BALUSTRADE; RENAISSANCE ART, *Architecture.*

**BALUSTRADE',** (from *baluster*). A range of balusters, together with the hand rail or capstone which they support; also any decorative railing or parapet, whether designed with balusters or not. It may serve as a parapet for a stairway, balcony, terrace, bridge, or roof, or as a railing for an altar or chancel, or a partition between the public and private parts of any room, as a court room or office. Unimportant as a feature in classic architecture, it was treated with considerable elegance of openwork tracery by the later mediæval architects. It was the Renaissance artists who invented the forms of vase-like balusters commonly used in neo-classic architecture. Among notable examples of Renaissance balustrades may be mentioned those of the Gondi

Palace court at Florence, of the cathedral pulpit at Siena, of the *tribuna* in the Sistine Chapel, of the two *cantorie* or music balconies formerly in the Duomo at Florence (now in the "Opera del Duomo"), sculptured respectively by Luca della Robbia and Donatello, and of the staircase tower of Francis I at Blois, France.

**BALUZE**, bȧ'lụz', ETIENNE (1630–1718). A French historian, born at Tulle. Almost his entire life was spent in Paris, and there he published his famous histories, *Histoire généalogique de la Maison d'Auvergne* (2 vols., 1708), and *Vitæ Paparum Avenionensium* (2 vols., 1693). The latter is on the *Index* because of its Gallicanism, and the former led to his temporary banishment because too favorable to Cardinal de Bouillon. He edited the works of Charlemagne and Servatus Lupus.

**BALZAC**, bȧl'zȧk', HONORÉ DE (1799–1850). The greatest novelist of France, and, according to some critics, of the world, if we regard at once the quantity of his work, the multitude and variety of his creations of character, his coördination of them into a microcosmic picture of the society of his time, and the scope and depth of his insight into the sordid ambitions and ideal impulses that actuate human life. His own career had given him a varied and acute experience. He was born at Tours, May 16, 1799, the first of four children of well-to-do *bourgeois*, self-indulgent, a little Rabelaisian, and not at all literary. His infancy was passed with a foster mother in the country. He showed no cleverness in his studies and found no appreciation at home, but he was a diligent pupil of the "truant school." His wanderings along the vineyards of the Loire and in the noisy cooper shops of the suburbs of Tours have left picturesque traces throughout his work, especially in the *Contes drôlatiques*, and he has borne an eloquent witness to the pathos of his school life in *Louis Lambert*.

Balzac had very early what his sympathetic sister Laure calls "the intuition of renown." A family misfortune was to him a kind providence, for it brought him at 19 to Paris and stimulated his literary activity by contact with Guizot, Villemain, and Cousin. His novels, especially *César Birotteau*, attest his three years' study of law; but he refused to practice, and in spite of discouragements, domestic and public, he devoted himself to literature, doubting sometimes his power, but never his vocation. It took him 10 years (1819–29) to learn his trade, the management of his novelistic tools. His work in this period ranks with that of Pigault-Lebrun. Only in the light of the future can it be said to show even promise of the kind of excellence which he was to realize. Harassed by poverty, oppressed by debts due to caprice and bad judgment, he worked indefatigably, and at last produced in *Les Chouans* (1829) a story of Brittany in 1799, one of the first and best of the historical novels of France, though its attempted imitation of Scott is more obvious than successful. What follows *Les Chouans*, good and bad, was admitted by Balzac to a place in his works; what went before, he ignored. The next six years were years of marvelous fertility, sustained excellence, and progressing power, fostered by intercourse with Hugo, Vigny, Lamartine, and George Sand. He made useful aristocratic acquaintances also, the Duchesse d'Abrantès and Madame de Castries, his Duchesse de Langeais. Then he fell under the spell of a Polish lady, Madame Evelina Hanska, whom he had met some years before, and till the death of M. Hanska, in 1842, his production and development suffer some check, to revive again for the complete flowering of his genius for five years (1842–47). After that he became more and more absorbed in plans for marriage with Madame Hanska, and hindered from work by illness and by visits to the Russian estates of his betrothed, whom he married there a few months before his death. Balzac's correspondence with his sister and his recently published letters to Madame Hanska are a sufficient revelation of his character. To an intense imagination that made him at times a visionary, he joined an intense application that made him at other times a recluse. In thought the child was a man; in action the man was a child, capricious and prodigal, full of schemes that made others rich and kept him poor; restless, passionate, morbid sometimes, especially in the hope deferred of his unfortunate relation to Madame Hanska, but never forfeiting sympathy, because always frank and almost childlike in his broad humanity. There was something awesome in the intensity with which he lived out his 50 years. Hugo expressed this when he said at his grave in Père Lachaise that "such coffins proclaim immortality. We feel the divine destiny of that intellect which has traversed earth to suffer and be purified. So great a genius in his life can but be a great spirit hereafter."

In any survey of Balzac's work it is well to consider first what he tried to do. He explains this in the preface to his novels collected under the title *La comédie humaine*. He says his thought was to do for human nature what had recently been done for zoölogy—to show that all society was bound together by a unity of composition, diversified by evolution in varied environments, so that there were species of men as of animals. The soldier, the lawyer, the workman, the scholar, the statesman, would show as distinct and abiding characteristics as the wolf, the shark, the ass, the raven, and the sheep. But this, he continues, would require several thousand characters; and how should he give unity to his creations? He would let society tell its own story. He would be its secretary, draw up an inventory of its virtues and vices, gather the facts of its passions, compose types for it by uniting homogeneous natures, and so produce a history of manners from the point of view of a conservative, a Christian, and a monarchist, who knew through friends the Old Régime and the Republic, and had lived under the Empire, the Bourbons, and the democratic monarchy of July. His novels were to be as a secretary's minutes, ideal in conception, but real in detail, shrinking from neither vice nor passion, because these are the motive forces that melt and recast human nature, but giving to religion its due place, and making virtue not only lovable but interesting. That is what he undertook to do, and though his work is incomplete, he left no part unessayed. His achievement stimulated Zola to write his pseudo-realistic novels of the Second Empire; while with scarcely less genius, English society has been drawn in the numerous books of Anthony Trollope, as many phases of nineteenth-century America are presented by William Dean Howells. Balzac has a right to ask that his work be judged as a whole, by the good as well as by the evil. Like that other *Comedy* of Dante, his *Human Comedy* has its Hell, but it has also its **Purga-**

tory and its Paradise. Balzac is by some considered immoral; others pronounce his work, as a whole, serious in purpose, high and edifying in tone.

The *Comédie humaine*, as it stands, vast yet unfinished, has been compared by Zola to a cyclopean palace, with splendid halls and wretched corners, with broad corridors and narrow passages, and superpiled stories in varied architecture. Two thousand characters cross its stage; and in their mimic life, which to Balzac for the time became reality, they formulate the chief types and events of social existence in such a variety of setting that his comedy has not only its genealogy but its geography. It is a work of criticism, analysis, and investigation, to be enjoyed in its parts, but to be understood only as a whole. Balzac divided his *Human Comedy* into *Scenes of Private Life*, of *Provincial Life*, of *Parisian Life*, of *Country Life*, of *Politics and War*, and to these he added *Studies*, philosophical and analytic. There are those who admire the analytic acumen displayed in this division; but as Balzac frequently transferred tales and novels from one to another group to suit his fancy or a publisher's convenience, it seems time wasted to stress the classification. It is more philosophical to study his work as it grew in his mind—i.e., chronologically—and then to treat it briefly in its entirety. *Les Chouans* was followed by six *Scènes de la vie privée* (1803), of which *El Verdugo* is a masterly tale of terror, and *Gobseck* one of the world's great studies of morbid avarice. *La maison du chat-qui-pelote* (1830), written before these, though published a little later, in its plea for conventional marriage shows Balzac to be a master in social psychology. And, as though he would excel at once in every genre, the same year witnesses the Dresden-shepherdess introduction and the luridly romantic close of *Une double famille;* the curious Machiavellianism of *Les deux rêves; Adieu*, a masterpiece of tragic pathos; the fantastic *L'elixir de longue vie;* two stories of abnormal love, *Sarrasine* and *Une passion dans le désert;* and, finally, an acute study of the purification of religious feeling through persecution in *Une episode sous la terreur*. And with all this came contributions to journals whose titles for this year alone fill two octavo pages of Louvenjoul's *Histoire des œuvres de Honoré de Balzac*.

A marvelous fertility characterized the next three years, till his first meeting with Madame Hanska (1833). Much of this time he passed away from Paris, to avoid interruptions. The more important works of 1831 are *La femme de trente ans* (incomplete), *L'enfant maudit* (incomplete), *Le réquisitionnaire, Les exilés* (a wonderful evocation of Paris in 1308, setting ajar the gate that was to open on the spirit world in *Louis Lambert* and *Séraphita*); *Le chef d'œuvre inconnu;* the remarkable *L'Auberge rouge;* the curiously mystic *Peau de chagrin;* the mediæval legend, *Jésus-Christ en Flandre;* a remarkable study of avarice, *Maître Cornélius;* and, outside the frame of the *Human Comedy*, the *Contes drôlatiques* (the first of three *dizaines* published till 1837). The work of 1832 is even more remarkable. It touches the depths of horror in *La grande Bretêche*, deals gracefully with romantic honor in *Madame Firmiani*, and with romantic love in *La bourse;* becomes pitiful in *Colonel Chabert*, and tragic in *Le message;* gives an exquisite picture of child life in *La grenadière*, preaches a stern social morality in *La femme abandonnée*, epitomizes the French clergy of the Restoration in *le curé de Tours*, unveils the courtesan morals of the Renaissance in *Les Marana*, and crowns the year with the mystic *Louis Lambert*. And during 1833, also, he tells a correspondent that he lives in "an atmosphere of thoughts, ideas, plans, works, conceptions, that mingle, bubble, and sparkle in my brain." Of these, the *Contes drôlatiques* show the effervescing of a joyous animal nature; *Férragus* is a sort of detective story; *Le médecin-de-campagne* is photographic in its reproduction of peasant thought and country scenes, and *Eugénie Grandet* is Balzac's greatest study of avarice, and perhaps his greatest novel. No wonder that in January, 1834, Balzac complains that he is "dazed with ideas and hungry for rest." Yet this year produced *Père Goriot*, thought by many to be his best novel; *La duchesse de Langeais, La recherche de l'absolu*, part of *Séraphita*, and many revisions of older work. Balzac now begins to suffer, naturally, from neuralgia, but in 1835 writes a fine study of remorse, *Une drame au bord de la mer;* an inferior one, *Melmoth réconcilié;* the weirdly sensuous *La fille aux yeux d'or;* and that subtly humorous "bride's breviary," *Le contrat de mariage*. His one long novel of the year, *Séraphita*, is regarded by many as an exquisitely mystic poem in prose, a hymn to the purification of human passion by a sublime aspiration for the divorce of sentiment from sense, first product of that love of his for Madame Hanska which almost immediately became a distraction and a hindrance to his genius. Students of Balzac are, however, not in accord as to the merits of *Séraphita*, which has been described as an obscure reflection of Swedenborgianism, and full of passages that are meaningless.

With 1836, we enter on a period of arrested development, although that year offers the charming *Messe d'Athée;* the ultra romantic *Lys dans la vallée;* the admirable last part of *L'enfant maudit;* a classic study of *La vieille fille*, the French *School for Scandal; L'interdiction*, a legal romance, and some less significant work. *Les employés* marks in 1837 the lowest ebb of the mature Balzac. *Gambara, César Birotteau*, and the *Contes drôlatiques* complete the work of that year; and 1838 is as relatively insignificant, with *Le cabinet des antiques, La maison Nucingen, Une fille d'Eve*, and the first part of what was to become a great novel, *Les splendeurs et misères des courtisanes*. In this year he bought a country house, "Les Jardies," where Gambetta was to meet his death, and where Balzac did most of his work until, in 1843, he bought and fitted up, in long-deferred hope of marriage, the city house in which he died. His country life lent a passing freshness to *Le curé de village* (1839) and to the early parts of *Béatrix*, a curious study of the instinct of social conformity common to all phases of feminine affection—the platonic, the cerebral, and the venal. To 1839 belongs also *Massimilla Doni*, and 1840 brought *Le secret de la Princesse de Cadignan*, the fine *Seconde étude de femme, Pierrette, La muse du département*, part of *Les illusions perdues*, with some very inferior work. Then something of his old exuberance returns, and 1841 sees *Une ténébreuse affaire*, the terrible *Bachelor Housekeeping* (*La rabouilleuse*), *Ursule Mirouet, Les mémoires de deux jeunes mariées, La fausse maîtresse*, and *Le martyr*

*calviniste*. The year 1842 is unimportant in production, but memorable for the first collected publication of the *Human Comedy* under that title, with its evolutionist preface, and for additions and revisions to which this gave occasion. In 1843, Balzac spins copy in *Honorine*, finishes *La muse du département* and *Les illusions perdues*, a satire on French journalism, his longest novel, and by the number of its characters and the ramifications of its plot, one of the chief radiating points in the study of the psychology of *La comédie humaine*. He visited Madame Hanska, now a widow, this year in Russia, and in 1845 and 1846 twice in Italy and once in Germany; but he now worked, as he says, "with a fury more than French—Balzacian." In 1844 he printed the playfully romantic *Modeste Mignon*, completed *Béatrix* and *Les petits bourgeois* (printed, 1854), and published all that appeared during his lifetime of *Les paysans*, the most sternly realistic of his novels. The years 1845 and 1846 produced only trivial work; but he was working on four great novels that were to crown his genius, *La cousine Bette*, *Cousin Pons*, *Les splendeurs et misères des courtisanes*, and *L'envers de l'histoire contemporaine*, that was to close the *Human Comedy* with its noblest conception of Christian womanhood. Sickness made his last years unfruitful; and his posthumous *Député d'Arcis* is largely by his literary executor, Charles Ribou. Balzac's attempts in drama, except possibly *Mercadet* (first acted in 1851), are not significant.

Balzac died in Paris, Aug. 18, 1850, at the height of his fame; but he was hardly appreciated at his true value until the epoch-making study by Taine (1865) showed him to be truly classic, one of the world's greatest creators in imaginative literature. The dominant trait in his style, imagination, and thought is exuberant virility. He has the animal and the intellectual intemperance of a romantic realist. He observes with minute accuracy, but with a poet's vision. He is of his world, yet he dominates it. No depths, no heights, of human nature seem foreign to him. His qualities become his defects. He is embarrassed at once by his wealth of ideas and of words. At his best his style is admirable, but it often staggers and occasionally falls under over-elaboration. In construction the stories lack proportion, but in character-drawing he stands next to Shakespeare. Here are the money-grubbers and the money-spenders, studied realistically and in symbolic types; cynics who mock the pleasures they pursue; parasites of social disease; fresh young girls; restless "women of thirty"; poor relatives; philanthropists; saints —a social microcosm. Here is a novelist who tried to see life steadily, to correlate all the material, moral, and social factors of modern society. With Shakespeare and Saint-Simon, says Taine, Balzac is "the greatest storehouse of documents that we have on human nature."

Balzac's works: 24 vols. fiction separately; *Human Comedy*, 47 vols.; *Droll Stories*, 3 vols.; *Drama*, 2 vols.; *Correspondence*, 2 vols.; *Letters to Madame Hanska*, 1 vol. The youthful *Works* are published in 10 vols. In 1913 there began to appear from the Imprimerie Nationale in Paris, the definitive edition of *The Comédie Humaine*, planned to consist of 43 volumes, with 1500 illustrations by Paul Huard. Three volumes contain bibliographical notes and other comments, a life of Balzac, and a critical estimate of his place in literature, while each volume is to contain a key to the identity of the persons whom Balzac had in mind in creating his characters that are famous in the particular volume. The researches of Count de Spoelberch de Lovenjoul are to be utilized, so as to make accessible all that is now known or probably will ever be known concerning this great master of fiction.

**Bibliography.** The more essential books for a study of Balzac are Lovenjoul, *Histoire des œuvres de Honoré de Balzac* (Paris, 1886); M. F. Sandars, *Honoré de Balzac: His Life and Writings* (New York, 1905); Corfbeer and Christophe (*Répertoire de la comédie humaine* (Paris, 1887), a dictionary of characters. For plots consult Barrière, *L'œuvre de Balzac* (Paris, 1890); for criticism, Lovenjoul, *La genèse d'un roman de Balzac; Les paysans* (Paris, 1901); the essays of Taine, Sainte-Beuve, Faguet, Zola, Paul Flat, Doumic, Duclaux (1909), Peck, and Wells, *A Century of French Fiction* (1898); for biography: Wormley, *Memoir of Balzac* (Boston, 1892; defective); Ferry, *Balzac et ses amis* (Paris, 1888); Lemer, *Balzac, sa vie et ses œuvres* (Paris, 1892); Hanotaux and Vicaire, *La jeunesse de Balzac* (Paris, 1903); A. Le Breton, *Balzac, l'homme et l'œuvre* (Paris, 1905); Ferdinand Brunetière, *Balzac* (Paris, 1906; trans. Philadelphia, 1906), with a bibliographical appendix; Frederick Lawton, *Balzac* (London and New York, 1910). Translations, fairly complete and satisfactory, of the *Human Comedy* are published in London, Boston, Philadelphia, and New York, the last-named containing valuable editorial and critical comment by W. P. Trent. The latest translation of the works of Balzac is the *Centenary Edition*, K. P. Wormley, translator (Boston, 1903–1912). Saltus, *Balzac* (Boston, 1888) has a good bibliography. The most indefatigable collector of Balzaciana has been Count de Spoelberch de Lovenjoul (q.v.), whose remarkable industry and lavish expenditure have lately given the world access to original documents that have thrown much new light on the life and thought of the great novelist.

**BALZAC,** Jean Louis Guez de (1597–1654). A noted French essayist and stylist. He was born at Angoulême of wealthy parents, and having received a good education was taken by Cardinal de la Valette to Rome, and wrote thence letters to persons prominent at court that made him recognized on his return as master of composition and style in a generation that regarded such abilities with excessive reverence. His letters, collected in 1624, are empty, bombastic, and affected, but they entitle Balzac to rank as a reformer of prose, as his contemporary, Malherbe (q.v.), is of verse. He underwent bitter accusations of plagiarism in 1625 and withdrew to Angoulême, where he produced his uninspired and laborious lucubration, *Le prince* (1631); *Discours* (1644); *Le barbon* (1648); *Aristippe*. He was elected to the Academy in 1634. Balzac's *Works* were collected in 2 vols. (Paris, 1665, 1854). The *Letters* are well edited by Larroque (Paris, 1874).

**BALZANI,** bäl-tsä'nē, Count Ugo (1847– ). An Italian historian, born in Rome and educated at the university of his native city. He became known as a distinguished scholar in his chosen field, and honors were heaped upon him at home and abroad. He was made a member of the Reale Accademia dei Lincei and of the Istituto Storico Italiano, and was chosen presi-

dent of the Reale Società romana di storia patria. In England the University of Oxford conferred upon him the honorary degree of Litt.D., and the British Academy elected him a corresponding fellow. To the transactions of various continental institutions with which he became connected he contributed many articles and reports, and wrote also: *Il Regesto di farfa di Gregorio di Catino* (1879); *La Storia di Roma nella Cronica di Adamo da Usk* (1880); *Early Chroniclers of Italy* (1883); *Le Cronache Italiane nel Medio Evo* (1884; 1909); *The Popes and the Hohenstaufen* (1886).

**BALZICO,** bäl-tsē'kō, ALFONSO (1825–1901). An Italian sculptor. He was born at Cava di Tirreni, near Salerno, and studied his art principally at Rome. On his return to Naples he secured the patronage of the Bourbon monarch, but his patriotic tendencies resulted in his call to Turin by Victor Emmanuel I. Among his commissions for the latter the principal were the bronze equestrian statue of Duke Ferdinand of Genoa (1867, Turin, his masterpiece), and Massimo d'Azeglio (1873, Turin). He removed with the royal family to the new capital, Rome, where his later life was spent. His other works include the marble monument to the composer Vincenzo Bellini, and the bronze "Victor Emmanuel" (1897), both in Naples; and "Cleopatra," a nude which obtained the gold medal at Paris, 1900. Balzico's art forms a marked exception to the dreary mediocrity of the Italian sculpture of his day.

**BAMAKO,** bä'mȧ-kō'. A town of Africa and, since 1904, the capital of the French colony of Upper Senegal and Niger. It is situated about 135 miles southwest of Segu, in lat. 12° 15′ N., and long. 8° 5′ W. (Map: Africa, D 3.). The town is the terminus of the Niger-Senegal Railway and is an important trade centre. Pop., 1911, 6539.

**BAMBA,** bäm'bȧ. A Bantu tribe of the Ba-Fyot, or Ba-Kongo group, Angola. They are of medium stature, the figure well rounded and well proportioned, with woolly hair, dark-brown color, beardless, and little hair on the body. They have adopted some of the arts of Europeans, though they easily revert under tribal influences. They are polygamists and ancestor worshipers, and practice witchcraft, although images of Roman Catholic saints are employed as fetiches. Small terra-cotta images are placed on the graves of important men.

**BAMBARA,** bȧm-bä'rȧ. A region in west Africa, situated on both sides of the upper Niger. It derives its name from the inhabitants, who were formerly under kings; but upon the overthrow of King Ahmadu in 1891 the country was divided into several states under Bambar chiefs. It is mountainous in the southwest and flat and often swampy in its northern part. It has a soil of remarkable fertility, yielding annually two crops of corn, rice, yams, and many kinds of fruit. Forests of butter trees cover vast tracts. The climate is very hot, and the lower parts of the country are subject to inundation from time to time by the Niger. The principal industries are the weaving of cloth, a work performed exclusively by women, and the manufacture of metal and leather products. The commerce is quite extensive. The principal towns are Segu, Sansanding, and Bamako. The region is a part of the French West African colony of Upper Senegal and Niger. The inhabitants are heathens of mixed negro and Fulah blood and belong to the Mandingo family. They are a mild and industrious people; but, despite their fertile soil and their thrifty habits, they have been reduced to the direst poverty by their Mohammedan oppressors, the Toucouleurs. Their country was visited by Mungo Park.

**BAMBERG,** bäm'bĕrĸ. A city in the district of upper Franconia, Bavaria, beautifully situated on the banks of the Regnitz, not far from its confluence with the Main, about 30 miles north of Nuremberg (Map: Germany, D 4). Numerous bridges connect the various sections of the city, which is intersected by three branches of the river. The streets are wide and well built, and there are a number of attractive squares. The most noteworthy of its public buildings is the cathedral, a magnificent edifice in the Byzantine style, founded by Henry II early in the eleventh century and restored after a fire in 1110. It contains, among other monuments, the elaborately carved tomb of the founder and his consort, Cunigunda. Attached to the cathedral is a library of over 300,000 volumes, with valuable missals and manuscripts and what is represented to be the prayer book of Henry II. There are several other fine ecclesiastical structures of early date and the old palace of the former prince-bishops of Bamberg. The ruins of the castle of Altenburg, originally the seat of the Count of Babenberg and the scene of many important historical events, stand on an eminence about a mile and a half from the town. The educational institutions of Bamberg are numerous, as are also the charitable institutions, which include a municipal hospital, an orphan and an insane asylum. The industries consist chiefly of the manufacture of beer — which is famous throughout Germany—cotton, woolens, gloves, furniture, musical instruments, shoes and leather goods, tobacco, sugar, starch, etc. The United States is represented by a consular agent. The city's government is in the hands of a municipal council of 42 members and an executive board of 19, elected by the former. Bamberg received municipal privileges in 973. Pop., 1900, 41,820; 1910, 48,063. Consult Vöge, "Ueber die Bamberger Domsculpturen," in *Repertorium für Kunstwissenschaft*, vol. xxii (Berlin, 1899).

**BAMBERGER,** bäm'bĕrĸ-ĕr, LUDWIG (1823–99). A German parliamentarian and writer on political and economic subjects. He was born at Mainz, of Jewish parentage, and studied law at Giessen, Heidelberg, and Göttingen. Implicated in the Revolution of 1849 as editor of the *Mainzer Zeitung*, he was condemned to death, but was amnestied in 1866. As a member of the National Liberal Party in the Reichstag (1871–80) he defended the gold standard against the bimetallists, opposed the economic policy of Prince Bismarck (after 1879), and advocated free trade, becoming the founder and president of the Verein zur Förderung der Handelsfreiheit. Compelled by his antagonism to Prince Bismarck's theories to resign from the National Liberal Party, he formed the group known as the "Secessionists," which afterward became merged in the German Liberal Party, and as a member of which he opposed the colonial policy of the government. The following are some of his important publications: *Erlebnisse aus der pfälzischen Erhebung* (1849); *Monsieur de Bismarck* (1868; English translation, 1869); *Die fünf Milliarden* (1873); *Deutschland und der Sozialismus* (1878); *Deutschthum und Judenthum* (1880); *Die Stichworte der Silberleute besprochen* (4th ed., 1893); *Erinnerungen* (published by Nathan, 1899).

**BAMBINO**, bäm-bē'nō (It. a baby). In art, the representation of an infant, especially of the Christ Child. The term is used of certain images of the swaddled Child, the most famous being the *Santissimo Bambino* in the church of Ara Cœli at Rome, held in great veneration for its supposed miraculous power of curing the sick. It is carved in wood, painted, and richly decorated with jewels and precious stones. The term "bambino" is also applied to any infant in Italian painting and sculpture; e.g., to the famous medallions of foundlings on the Foundlings' Hospital, Florence. See illustration.

**BAMBOCCIADE**, băm'bŏch-ĭ-ād' (Fr. *bambochade*, It. *bambocciata*, caricature, from *bamboccio*, puppet, little child). A picture of common rustic life treated with grotesque humor; a kind of genre painting of low life. The term is said to be derived from the nickname of Van Laer, *Bamboccio*, "the cripple." Tavern scenes, rollicking and boisterous village games, with smoking, drinking, and festival making are favorite subjects in this style of painting. Dutch and Flemish painters of the seventeenth century were unrivaled in such subjects; such as Brauwer, the brothers Ostade, Teniers the Younger, Jan Steen, Peter van Laer, and many others. In the nineteenth century certain painters of the Munich school (Knaus, Defregger, Vautier) often painted in this vein, as did Wilkie and others in Great Britain.

**BAMBOO'** (Malay, *Cambu Mambu*). A name applied to about 200 species of *Bambusa*, *Arundinaria*, *Phyllostachys* and other genera of grasses, many of which attain a great size, some 70 to 100 feet in height, and have trunks a foot in diameter. The species are numerous and are found in tropical and subtropical regions, both of the eastern and western hemispheres They are of great importance to the inhabitants of the countries in which they grow, being found from sea level to 12,000 feet in the Himalayas and 15,000 feet in the Andes. All of them have a jointed subterranean rootstock (rhizome) which throws up numerous stems. These are generally straight and erect; although one large species (*Bambusa agrestis*), common in dry mountainous situations in the southeast of Asia, has crooked and sometimes creeping stems. The stems grow to their full height unbranched, but afterward throw straight horizontal branches, especially in their upper parts, forming a dense thicket; and many of them, being strongly armed with spines, are planted for defense. Some of the smaller kinds are often planted as hedges. The stems are jointed like those of other grasses, very hard, but light and elastic, hollow, containing only a light spongy pith, except at the joints or nodes, where they are divided by strong partitions. They are therefore readily converted into water vessels of various sorts; and when the partitions are removed, they are used as pipes for conveying water. They are also much employed for housebuilding, for bridges, etc. Split bamboo is extensively used for weaving into nets, for hats, umbrellas, fishing rods, etc. The smaller stems are converted into walking sticks and are employed in light wickerwork. In China the leaf sheaths and other portions of the stem are used for making paper. Recent experiments in India show that some species of bamboo are well suited for the production of paper pulp. The stems of different species vary also very much in the thickness of the woody part and so in their adaptation to different purposes. The external covering of the stem is, in all the species, remarkably silicious; the stem of *Bambusa tabacaria* is so hard that it strikes fire when the hatchet is applied. This species is a native of Amboyna and Java; its slender stems are polished and used for the stems of tobacco pipes. The leaves of some kinds are used for thatch, and the Chinese plait hats of them. From the nodes of the bamboo there exudes a saccharine juice which dries upon exposure to the atmosphere, and which the Greeks called Indian honey. It is also sometimes named tabaris or tabasheer; but this name more properly belongs to the phosphorescent silicates found in some species of bamboo and of other large grasses growing in dry situations. (See TABASHEER.) The young shoots of some kinds of bamboo are eaten like asparagus or are pickled in vinegar. The seeds of some species are used as rice and for making a kind of beer. Bamboos are generally of very rapid growth, and they are often found in arid situations, which would otherwise be destitute of vegetation. The species common in the West Indies (*Bambusa vulgaris*) is supposed to have been introduced from the East Indies. Some species are hardy in England and in parts of the United States, where they are used in landscape gardening. A number of species were introduced into the United States from Japan in 1902, and they are reported as growing satisfactorily in Florida and Louisiana. *Arundinaria macrosperma* is native to the southern United States, where it forms extensive canebrakes. See Plate of BALSAM.

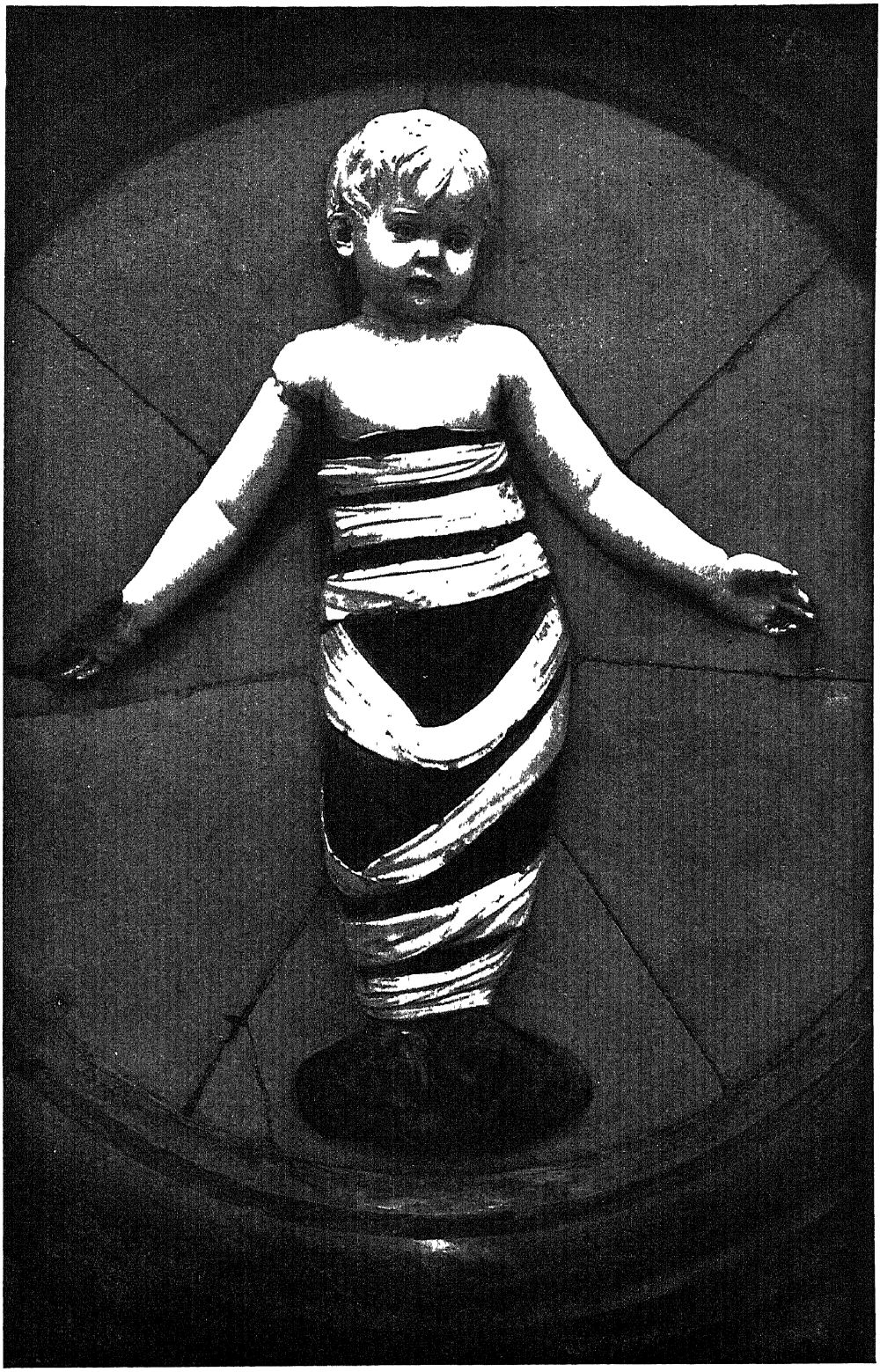
**Fossil Forms.** Fossil forms of bamboo are abundant in the Pleiocene deposits of France.

**BAMBOO RAT.** Any of various species of mole rats (q.v.) of India and eastward, belonging to the genus *Rhizomys*, and found in and near bamboo jungles.

**BAMBOROUGH** (băm'bûr-ō) **CASTLE** (fortress of Bebba, Queen of Ida). An English castle situated in the village of the same name, 14 miles north of Alnwick, in Northumberland. It was erected by Ida of Northumberland and was repeatedly assailed in the wars of the Saxon and Danish kings. In 1095 it was held by Earl Mowbray against William II. During the Wars of the Roses the fortress was greatly damaged, but was restored in the eighteenth century.

**BAMBUK**, bäm-bōōk'. A hilly region in west Africa, situated between the river Senegal and its tributary, the Faleme, and forming a part of the French colony of Sénégal. Except for its unhealthful climate, Bambuk is a well-favored country, with a very rich vegetation and well adapted for cattle raising. Its special importance, however, lies in gold deposits, which are so extensive as to be found almost in every part of the country. But the output is insignificant, as exploitation is entirely in the hands of the natives. The population, estimated by some at 800,000, belong to the Mandingo family and ostensibly profess Islam; but practically they are pagans and of a very ferocious disposition. Bambuk was explored by Mungo Park, Tourret (1824), Raffenel (1847), Flize (1856), Pascal (1860), Marge and Quintin (1863), and has been under French protection since 1858. Consult Riorot, *A travers le Fouta Djallon et le Bambouc* (Paris, 1885).

**BAMIAN**, bä'mē-än'. Once a famous town and valley of Afghanistan, situated about 80 miles northwest of Kabul (Map: Asia, Central, L 3). The valley is at an elevation of 8496



BAMBINO

FROM THE SCULPTURE BY ANDREA DELLA ROBBIA IN THE FOUNDLINGS' HOSPITAL, FLORENCE

feet and is the only known pass over the Hindu-Kush, 40 miles north of the ruins of Bamian, for artillery and military transport. This is believed to have been the route followed by Alexander the Great in his conquests in western Asia. Considerable interest attaches to this region on account of the historical remains in the form of numerous cells hewn in the rock, and the gigantic statues which seem to indicate that the place was once one of the chief centres of Buddhist worship. The two largest statues are found in a deep niche and in spite of their dilapidated condition still show some traces of elaborate carving and painting. Each contains a winding stair, by which it is possible to ascend to the head. The whole valley is covered with the ruins of tombs, mosques, and other buildings, once belonging to the town of Ghulghuleh, which more recently occupied this site and was destroyed by Genghis Khan in 1221. Eight miles eastward of Bamian lies the ancient fortress of Zohak, attributed to the fabulous Persian serpent-king of that name. The fortress is preserved for the purpose of guarding the important pass. Both there and in the valley of Bamian a great number of coins, ornaments, and other antiquities have been found.

**BAMP'TON LEC'TURES.** These lectures are so called after the name of their founder, the Rev. John Bampton, Canon of Salisbury (died 1751), who left estates, originally worth £120 per annum, to the University of Oxford, for the endowment of eight divinity-lecture sermons, to be preached at Great St. Mary's every year and to be published at the expense of the estate within two months of their being preached. The preacher is to lecture on one of the following subjects: "The Confirmation of the Christian Faith and the Confutation of all Heretics and Schismatics," "The Divine Authority of the Scriptures," "The Authority of the Primitive Fathers in Matters of Christian Faith and Practice," "The Divinity of Christ," "The Divinity of the Holy Ghost," "The Apostles' and Nicene Creeds." No person is qualified to preach these lectures who has not taken the degree of M.A., either at Oxford or Cambridge, and the same person shall never preach them twice. The first course was delivered in 1780, and they are still continued (since 1895, biennially). The more noteworthy of these lectures are those by White, in 1784, *Christianity and Mohammedanism;* Nott, in 1802, *Religious Enthusiasm* (against Whitefield and Wesley); Mansel, in 1858, *The Limits of Religious Thought;* Liddon, in 1866, *Our Lord's Divinity;* Hatch, in 1880, *The Organization of the Christian Churches;* Farrar, in 1885, *History of Interpretation;* Cheyne, in 1889, *The Psalter;* Gore, in 1891, *The Incarnation;* Sanday, in 1893, *Inspiration;* Inge, in 1899, *Christian Mysticism.* The complete and official list of lectures will be found in the *Historical Register of the University of Oxford* (published yearly).

**BAN** (OHG. *ban, bann,* AS. *bann,* order under threat of punishment; hence Fr. *ban,* public proclamation). A word derived from a root signifying 'to signal,' 'to proclaim,' which meaning it retained in the phrase *bans* or *banns* (q.v.) of marriage. In feudal times it denoted a summons to arms and also the military force thus summoned. The latter meaning it retains in several countries of Europe—as in France, where the National Guard is classed as the *ban* and the *arrière-ban,* or reserve; and in Germany, where the two divisions of the *Landwehr* are distinguished as the first and second *bans,* respectively. In the Middle Ages the *Acht* or *bannum* was a sentence of outlawry pronounced against those who escaped from justice or refused to submit to trial. We often read of refractory princes, and even cities in Germany, being placed under the *ban of the Empire.* The following are the terms of banning used in an old formula: "We declare thy wife a widow and thy children orphans; we restore all thy feudal tenures to the lord of the manor; thy private property we give to thy children, and we devote thy body and flesh to the beasts of the forest and fowls of the air. In all ways and in every place where others find peace and safety, thou shalt find none; and we banish thee into the four roads of the world—in the devil's name." Besides these sentences of outlawry, many other announcements were accompanied with denunciations and imprecations. When a grant of land was made for a religious purpose, or when a charter of liberties was granted, the transaction was proclaimed in public with certain ceremonies, and curses were denounced against any one who should violate the deed. Thus *banning,* or publishing, came to be associated with cursing; and hence the origin of the popular use of the word. It occurs in this sense in Shakespeare, Milton, and other early writers. The phrase "ban of the Church" is the equivalent of the term "excommunication" (q.v.).

**BAN,** or **BA'NUS** (*ban,* in Southern Slavic and Hungarian, from Persian *bān,* lord; cf. Russ. and Pol. *pan,* master, lord). The title given to some of the military chiefs who guarded the southern boundaries of the Hungarian Kingdom. It is equivalent to the German *markgraf* and the English "Lord of the Marches." The ban was appointed by the King, and his appointment was ratified by the Diet. In political, judicial, and military affairs his powers were almost royal, especially within his own territory. In times of war he led the troops of his *banat* (q.v.). Among the *banats* were those of Dalmatia, Croatia, Slavonia, and Bosnia. Their boundaries were constantly changing with the encroachments of the Turks. In the sixteenth century there was formed the double *banat* of Dalmatia and Croatia. In the reign of Maria Theresa the ban was acknowledged to be the third dignitary of the Kingdom of Hungary; appointed a member of the Hungarian Council of Government, and President of the Council of the Banat; and was made the bearer of the Golden Apple (the symbol of sovereignty) at the coronation of the King. In 1849 Croatia, Slavonia, and Dalmatia became Austrian crownlands; but by the *Ausgleich* of 1867 Croatia and Slavonia were restored to Hungary and continued as a banat, with a special local administration for internal affairs.

**BAN,** bän, MATIJA (1818–1903). A prominent poet of the southern Slavs. He was born at Dubrovnik (Ragusa), where he received a good education, including a thorough knowledge of French and Italian. He traveled extensively over the Balkan Peninsula, made his literary début with Italian lyrics (*Il terremonto di Ragusa; Il Moscovito; Radimiro*), and settled in Belgrade (1844) as tutor to the daughters of Prince Alexander Karageorgevitch. It was for their benefit that he wrote *The Woman's Educator* (3 vols., Belgrade, 1847). From 1849 till 1853 he published the literary-scientific maga-

zine *Dubrovnik* at the city of the same name. Besides a drama, *Mejrima*, he published in his native tongue *Various Songs* (1853), mostly on erotic and political themes, and the following year was appointed instructor in French and Italian at the Belgrade Lyceum. The adverse criticism evoked by his ode addressed to the Sultan forced him to resign this post and devote the rest of his life to literary labors and travel. Among his tragedies the most noteworthy are *Dobrilo and Milenka; Tsar Lazar; The Death of Prince Dobroslav; Jan Hus* (1884); *Martha the Statholder; or, The Fall of Novgorod the Great* (1881).

**BANA**, bä'nâ. A thousand-armed deity in Hindu mythology. His arms were cut off by Krishna, but his life was spared by the interposition of Siva, who was his friend.

**BANA** (seventh century A.D.). A Sanskrit author. His greatest works were two novels, the *Harshacarita*, or *Adventures of Harsha*, a historical romance (Eng. trans. by Cowell and Thomas, London, 1897), and the *Kādambarī* (Eng. trans. by C. M. Ridding, London, 1896). Both of Bana's stories are largely indebted to the *Vāsavadattā* of Subandhu. He also wrote the *Parvatīpariṇayanatakam*, or 'Parvati's Marriage,' based on the *Kumārasambhava* of Kalidasa and a farce, the *Sarvacarita*. A lost drama by him entitled *Mukuṭataditaka* is mentioned, and some have ascribed to him the Buddhist play *Nagānanda*, or 'Joy of Serpents,' usually attributed to Harsha or to Dhavaka. Bana's lyrics are contained in his *Caṇḍūśtaka*, or 'Century of Durga.'

**BANAK**, bän'ak, or **BANNOCK** (native name *pan-iti*). A warlike tribe of Shoshonean stock, formerly roving over southern Idaho and eastern Oregon, and now concentrated upon the Fort Hall reservation, Idaho. They are confederated with the Shoshone, the two tribes together numbering about 1400 persons, "so intermarried and related to each other that it is nearly impossible to distinguish one from the other." Consult R. H. Lowie, "The Northern Shoshone," *Anthropological Papers, American Museum of Natural History*, vol. ii (1909).

**BANANA**, bâ-nä'nâ. The only seaport of the Belgian Congo and situated on a small sandy peninsula on the west coast of Africa, at the mouth of the Congo (Map: Belgian Congo, B 4). The town is a trading station, contains a number of foreign factories, and has a white population of about 120. The port is connected by steamship lines with Hamburg, Liverpool, and Antwerp.

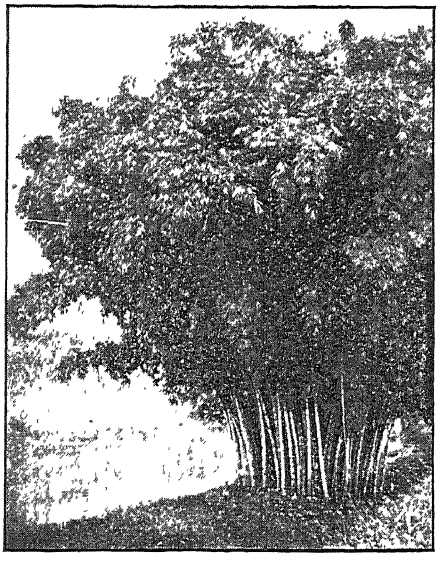
**BANANA**, bâ-nä'nâ (Sp. the fruit of the tree *banano*). A name applied alike to the well-known fruit and to the plant which bears it. Most of the varieties commonly eaten raw belong to the species *Musa sapientium*, which name signifies 'muse of the wise,' and is intended to convey an allusion to a statement by Theophrastus concerning a fruit which served as food for the wise men of India, and which, from his description, is supposed to have been the plantain or banana. The names "plantain" and "banana" are somewhat vaguely used in their application to different cultivated varieties, but the true plantains or cooking bananas belong to *Musa paradisiaca*. The banana is a tropical plant grown for its fruit, fibre, and the beauty of its foliage. It is evidently of Indian origin, but is now extensively cultivated in all tropical countries of the world. It is a large herbaceous plant with a perennial root or rhizome, from which the plant is perpetuated by sprouts or suckers. The young plants may be transplanted, after attaining a height of 3 feet, by cutting them loose with a spade; such plants should be set deeply in rows of 8 to 12 feet apart, so that the broad leaves will shade the ground. It can be increased by root cuttings planted shallow and covered with peat or peaty compost. Young plants of this sort must be transplanted to full light and be given ample room as soon as two or three leaves have formed. The banana begins to bloom in 1½ to 2 years after being established. The flower bud is a peculiar, large heart-shaped formation which, on developing, exposes a true flower under each of its scales. From 50 to 150 of these may be developed in a single bud, from which a bunch containing as many bananas will develop. The plant grows from 10 to 40 feet in height and carries a whorl of broad ornamental leaves at the top of the stalk. A stalk bears but once, dies down, and is replaced by sprouts, two or three of which are allowed to bear.

The species grown for their fibre, as well as those grown for ornament, usually produce seed, while the edible banana of commerce is seedless. Those which bear seeds are usually propagated by seeds, as it is more economical. Dwarf sorts are chiefly used for ornamental planting and landscape effect, but the Chinese Dwarf or Cavendish banana, *Musa cavendishii*, is an important shipping banana in Hawaii. Recently this variety has been somewhat extensively planted in Central America because it is more resistant to disease than the varieties commonly grown there.

There are many varieties of the banana, but the variety most commonly grown is the Martinique, a large yellow fruit growing in large dense clusters. The *baraçoa*, or Red Jamaica, is now but sparingly grown as compared with a few years ago and is seldom exported. The banana is a very important fruit, wholesome, palatable, reasonable in price, and in market the year round. It is eaten raw and cooked. For the latter purpose the under-ripe fruit in which starch has not yet been converted very largely into sugar, is preferable. Bananas have, on the average, the following composition: water 75, starch, sugar, etc. 21, and fat, crude fibre, protein, and ash each 1 per cent. This fruit has a little lower water content than other common fresh fruits and so a little higher food value, pound for pound. Its food value lies in the carbohydrates (sugar, starch, etc.) it supplies, the energy value being 460 calories per pound.

The imports of bananas in the United States alone have increased from a few hundred bunches in 1870, to $14,484,258 in 1913. The fruit comes chiefly from the West Indies and Central America, although some is produced in Florida, Louisiana, California, and Hawaii. Banana flour, made by grinding the dried unripe fruit, is used quite largely in banana-growing countries, and is becoming known elsewhere. Dried ripe bananas, used like figs or raisins, are also finding a market. See PLANTAIN. For illustration see BREADFRUIT TREE.

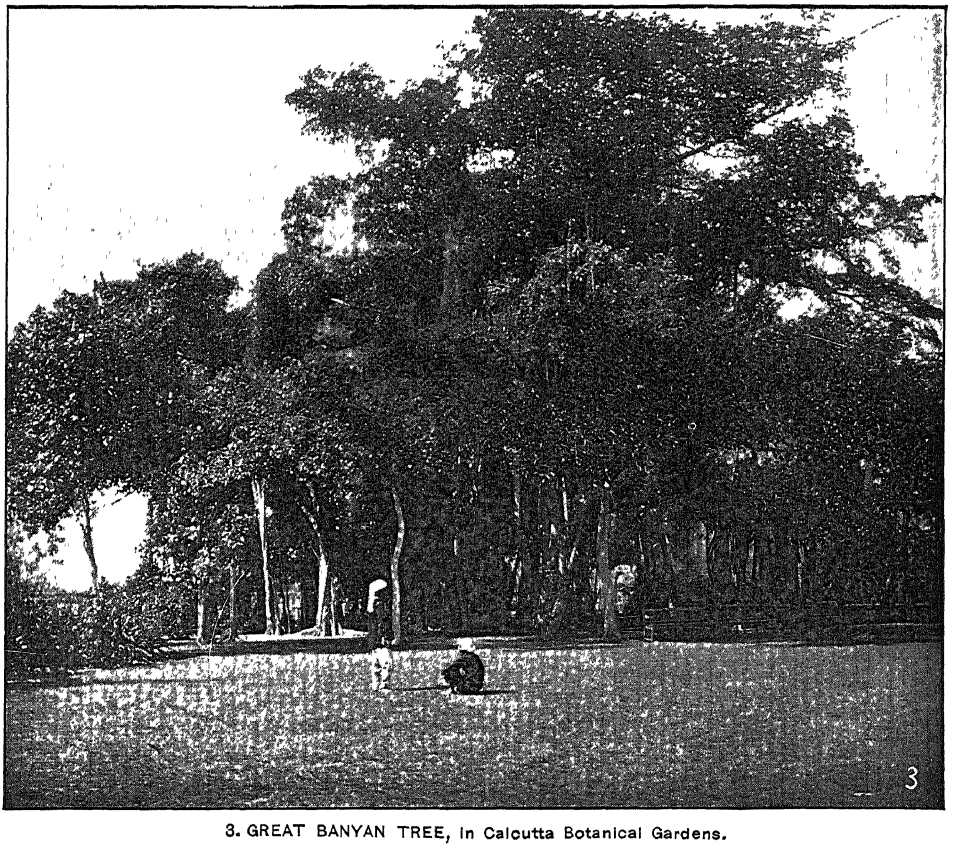
**Banana Diseases.** With the rapid extension of commercial plantings of bananas a number of serious diseases have appeared in Central America, South America, and the West Indies. There is divided opinion regarding the causes of these



1. GIGANTIC BAMBOO, from Ceylon.



2. PAPER BIRCH (Betula papyrifera).



3. GREAT BANYAN TREE, in Calcutta Botanical Gardens.

diseases. Some appear due to bacterial attack, while others are attributed to parasitic fungi. One disease, known as the Surinam Panama disease, has practically ruined the plantations in Surinam. According to Drost, it is due to the fungus *Leptospora musæ*. Another trouble, also known as Panama disease, is caused by species of Fusarium. There appear to be marked differences in the resistance of different varieties to these diseases. Other fungi reported as seriously attacking banana plants are *Marasmius semiustus, Sphærostilbe musarum, Thielaviopsis paradoxa,* and *Cercospora.*

**BANANA-BIRD.** The name of several birds which feed on bananas. In the American tropics any species of oriole (*Icterus*) or a hangnest may be so called, though this is a book name rather than one in common use. (See ORIOLE.) In Jamaica and the Antilles the small honeycreepers of the genus *Certhiola* or Cœreba are popularly called banana-quits (see Plate of CREEPERS), and the African plant-cutters—glossy black, cuckoo-like birds of the genus *Musophaga*—are styled banana-eaters.

**BANANA FAMILY.** See MUSACEÆ.

**BANANA-FISH.** See LADYFISH.

**BANANAL,** bä'nȧ-näl' (also called Santa Anna). An island lying in the Rio Araguaya, province of Goyaz, Brazil (Map: Brazil, G 6). It is over 200 miles long, with a width of 35 miles, has a fertile soil and forests of valuable woods. North of the centre is a lake of considerable size.

**BANAS,** bȧ-näs', or **BUNAS,** bŭ-näs'. A river of Rajputana, near the Aravalli Hills, and joining the Chambal after a northeasterly course of over 300 miles (Map: India, C 3).

**BANAT,** băn'at, *Ger. pron.* bȧ-nät' (for derivation, see BAN). A common name applied to any district or territory under the administration of a ban, but specially applied to a district of southern Hungary comprising the three counties, Temes, Torontál, and Krassó-Szörény (Map: Hungary, G 4), though it was never ruled by a ban. The total area is 11,013 square miles; the total population, which is very heterogeneous, in 1900 was 1,528,605, and at the census of Dec. 31, 1910, 1,582,133. Temes has an area of 2761 square miles, with (1900) 400,910 inhabitants (in addition Temesvár and Versecz, towns with municipal rights, with 33 square miles and 72,555 inhabitants and 76 square miles and 27,370 inhabitants respectively); Torontál, 3823 square miles and 594,343 inhabitants (in addition, Pancsova, town with municipal rights, 44 square miles and 20,808 inhabitants); Krassó-Szörény, 4276 square miles and 466,147 inhabitants. The principal town of the district is Temesvár. The Banat is one of the most fertile and best-cultivated districts of Hungary. Owing to its mild climate and rich soil, abundant crops of grain and fruits are raised, while the mountains contain rich mineral deposits, especially coal. Among its numerous mineral springs, the best known are those of Mehádia, in Krassó-Szörény county. The district, which from 1652 to 1716 was under the Turkish dominion, became uninhabited and covered with forest and marshes, but was reclaimed under Maria Theresa, who drained the land by means of canals and by free grants of land induced a considerable immigration from Germany, Turkey, and Servia, thereby laying the foundations of its present prosperity. In 1779 it was united with Hungary. It was formed into an Austrian crownland in 1849, but was restored to Hungary in 1860. See BAN.

**BAN'BRIDGE.** A town in county Down, Ireland, built on a steep slope on the left bank of the Bann, 76 miles north of Dublin (Map: Ireland, E 2). It is a thriving seat of linen manufacture in all its stages, from the preparation of the soil for the flaxseed to the finishing of the finest linen. Miles of bleaching-greens exist in the vicinity, while there are numerous factories along the Bann. Pop., 1901, 5006; 1911, 5101.

**BANBURY,** băn'bĕr-ĭ (anciently Berenburig, Bera's fort). A market town in Oxfordshire, England, on the Cherwell, and the Oxford Canal, 23 miles north of Oxford (Map: England, E 4). Banbury is the centre of the famous rich red land of Oxford County. This region is one of the most fertile in the kingdom. Banbury is noted for its manufacture of agricultural implements and for malt liquors, leather, cheese, and cakes. It was a stronghold of Puritanism in the seventeenth century, and the term "Banbury man" came to be applied, as a term of derision, to the typical Puritan. The old "Banbury Cross," famous in the nursery rhyme, is replaced by a modern one. There are a castle, several fine churches, and the town possesses excellent schools. It was incorporated as early as 1553. Pop., 1891, 12,767; 1901, 12,967; 1911, 13,458. Consult Beesley, *History of Banbury* (London, 1841). See CROSS.

**BANC** (OF. *banc,* Low Lat. *bancus,* MHG. *banc,* Ger. *Bank,* bench). In law, the bench or seat of judgment. Hence the sittings of a superior court of common law, composed of more than one judge, to determine questions of law; or the sittings of a full court or quorum, as distinguished from the sittings at *nisi prius* (q.v.), or by one judge, for the purpose of trying issues of fact, are called "sittings in banc" or "in banco." The term is in use in the United States as well as in England. See BENCH; COMMON BENCH; COURT.

**BANCA,** băn'kȧ, or **BANKA.** One of the Dutch East Indian islands northeast of Sumatra, from which it is separated by the Banca Strait. It is of an oblong shape and covers an area of about 4379 square miles (Map: East Indies, C 5). Its surface is generally flat, although it has some elevations on the northern and southern ends. The climate is moist and unhealthful for Europeans. The most important product of the island is tin, which has been mined by the government since 1832. The annual yield of that metal is between 15,000 and 20,000 tons. The surface is heavily wooded and the flora is remarkable. Spices grow widely, as do other tropical products. The principal articles of import are rice and salt. Administratively Banca, together with a few adjacent small islands, constitutes a separate residency. The population of the residency in 1905 was 115,189, of which 327 are European and over 43,723 Chinese.

**BANCA,** băn'kȧ. A small boat, used in the Philippine Islands. It is shaped from a single log and therefore belongs to the class called "dugouts." Practically all of them are fitted with outriggers like the proas. The crosspieces are usually of bamboo, and the float is often of the same material. A few of the boats are of rather large size, are built with frames and planking, and have a schooner rig.

**BANCBANUS.** See BANKBAN.

**BANCO,** băn'kō (It. bench, counter, bank). A commercial term meaning the standard money in which a bank keeps its accounts, as distinguished from the current money of the place. The distinction was more necessary when the currency consisted, as it often did, of clipped, worn, and foreign coins. These the early banks (at Venice or Amsterdam, for instance) received at their intrinsic worth, crediting the depositor in their books with this bank value. The term was chiefly applied to the money in which the Hamburg bank kept its accounts, before the adoption of the new universal coinage of the German Empire. It was not represented by any coinage.

**BANCROFT,** băn'krŏft *or* băn'krŏft, CECIL FRANKLIN PATCH (1839–1901). An American educator, born at New Ipswich, N. H. He graduated in 1860 from Dartmouth College, studied in German universities, and in 1867 having finished his course at Andover Theological Seminary, was ordained to the Congregationalist ministry. From 1860 to 1864 he was principal of the Appleton Academy at Mount Vernon, N. H., and from 1867 to 1872 of the Lookout Mountain Educational Institutions, Tennessee. In 1873 he was appointed principal of Phillips Academy, Andover, Mass. It is said that he prepared more students for colleges and scientific schools than any other secondary school instructor in the United States. He published many contributions in periodicals and made numerous public addresses. He was at various times president of the Head-masters' Association, the Dartmouth Alumni Association, the New England Association of Colleges and Preparatory Schools. Consult *Andover Townsman*, Oct. 11, 1901.

**BANCROFT,** EDWARD (1744–1820). An American naturalist and chemist. He was born in Westfield, Mass., but at an early age he went to Guiana and there practiced medicine. Later he went to England, where, through the close friendship of Franklin, he obtained a place on the staff of the *Monthly Review*. While holding this position he wrote a series of strong articles in maintenance of American rights and in vindication of Franklin's relation to the *Hutchinson Papers* episode. Charged with arson in 1777, he fled to Paris and became a spy in the employ of the American Commissioners there. It has been commonly charged that he sold information gained from Silas Deane, a former teacher of his, to the British government. There does not seem to be much foundation for this. The reports of the American Commissioners show that he enjoyed their utmost confidence. (Consult Wharton, *Diplomatic Correspondence of the American Revolution*, Washington, 1889.) In 1769 Bancroft published a *Natural History of Guiana* and in 1794 the first volume of an extended work on colors and calico printing, *Experimental Researches concerning the Philosophy of Permanent Colors*. In the meantime (1785) Parliament had granted him special rights of importing and using a certain kind of oak bark in calico printing.

**BANCROFT,** FREDERIC (1860– ). An American historian, born in Galesburg, Ill. He graduated from Amherst College in 1882, received the degree of Ph.D. from Columbia in 1885, and spent several years abroad in study at German and French universities. From 1882 to 1892 he acted as librarian to the Department of State at Washington. At various times he was lecturer at Amherst College and at Columbia, Johns Hopkins, and Chicago universities on the political and diplomatic history of the United States and Europe. In 1900 he was a delegate to the Congress of Historians at Paris, and in 1902–03 he lectured at the Lowell Institute in Boston on "Life in the South." A member of the literary staff of the *Nation* for many years, he contributed also to other reviews and to magazines articles on historical subjects, and published *The Negro in Politics* (1885); *Life of William H. Seward* (1900); *The Public Life of Carl Schurz*, with William A. Dunning (1908); *Speeches, Correspondence, and Political Papers of Carl Schurz* (1913).

**BANCROFT,** GEORGE (1800–91). An American historian. He was born at Worcester, Mass., Oct. 3, 1800, and as the son of the Rev. Aaron Bancroft, a Unitarian clergyman, the author of a *Life of Washington*, he inherited the blended qualities of the historian and the ecclesiastic. He was trained at Exeter, N. H.; entered Harvard College at 13, and on his graduation in 1817 went to Göttingen, where he took the degree of Ph.D. in history, being among the first of Americans to study there. His studies were in German, French, and Italian literature, in the classics, Arabic, Hebrew, history, and natural sciences. Leaving Göttingen in 1820, Bancroft went to Berlin, enjoying the society of Schleiermacher, Wilhelm von Humboldt, Varnhagen von Ense, and other distinguished scholars. He studied also at Heidelberg, and on a visit to Jena met the venerable Goethe at Weimar. Returning in 1822 to America, he became tutor in Greek at Harvard and essaying his father's profession, preached occasionally with moderate approval. But literature soon claimed him. In 1823 he published a volume of verse, and with Dr. Joseph G. Cogswell opened a school at Northampton. In the next year he published a translation of his former teacher, Heeren's *Politics of Ancient Greece*, and in 1826 an *Oration*, advocating universal suffrage as the foundation of true democracy. In 1830 he was elected without his knowledge to the Legislature, but he declined to serve and in the next year refused a nomination. Already he was absorbed in his great historical work, *The History of the United States*, of which the first volume appeared in 1834, and the tenth 40 years later. In this form the book was published in 6 volumes (1870–76), 2 concluding volumes (xi and xii) were published (1882) as a *History of the Foundation of the Constitution of the United States*, and the whole appeared in a final revision in 6 volumes (1884–85), as the *History of the United States, from the Discovery of America to the Inauguration of Washington*.

But though this bulky history occupied thus the central position in the labors of a lifetime, it did not engross Bancroft's scholarly activities. In 1830–35 he wrote a *Political Address* to the people of his State, at the request of the Young Men's Democratic Convention, and, giving up his school, moved to Springfield, where he gave himself wholly to historical studies, till, in 1838, he was made Collector of the Port of Boston by President Van Buren. The Democratic party nominated him for governor in 1844. He failed of election by a small margin, and was appointed Secretary of the Navy by President Polk. His management was marked

by the establishment of the Naval Academy at Annapolis, which was devised and organized on his sole initiative by an ingenious straining of executive authority. He also fostered the work of the Washington Observatory and raised the standard of professorial instruction. He showed diplomatic foresight and decision in constantly renewed orders to the American Pacific Squadron to seize California in case hostilities should break out with Mexico—orders executed with far-reaching results. Acting temporarily as Secretary of War, it fell to him to give the command to march troops into Texas. His services at Washington led to his appointment as Minister to Great Britain (1846–49), where he procured modification in the laws of navigation and allegiance. On his return in 1849 Bancroft lived in New York, devoting himself to historical studies, interrupted by diplomatic services as Minister to Prussia in 1867, to the North German Confederation (1868), and to the new German Empire in 1871. From this post he was recalled at his own request in 1874. While Minister at Berlin he assisted in the settlement of the Northwest Boundary dispute between the United States and Great Britain. Oxford made him a D.C.L. in 1849, and Bonn a J.U.D. in 1868. His miscellaneous publications are very numerous. Among the more important may be named an oration at Springfield (July 4, 1836); *History of the Colonization of the United States* (1841); and an oration in commemoration of Andrew Jackson (1844); *The Necessity, the Reality, and the Promise of the Progress of the Human Race* (1850–54); *Memorial Address on Abraham Lincoln* (1866); *A Plea for the Constitution of the United States* (1886); and *Martin Van Buren* (1889). His last address was at the opening of the third meeting of the American Historical Association, April, 1886. His old age was spent in Washington and at his summer home at Newport in charming domesticity. Bancroft was twice married. He died at Washington, D. C., Jan. 17, 1891.

As an historian Bancroft was a democratic idealist. His zeal for justice was deep, but occasionally misdirected; his patience in gathering materials indefatigable; his literary composition labored and frequently over-elaborated. There is a tendency to ponderous expression and to philosophic discursiveness; but though somewhat out of tune with the historic spirit and the literary taste of our own day, his work exercised a very great influence on the generation of the Civil War in stirring and maintaining in the American people the inspiring conception of a continent dedicated to liberty.

Consult: Davis, "George Bancroft," in *American Academy of Arts and Sciences*, vol. xxvi (Boston, 1846–1900); Green, *George Bancroft* (Worcester, 1891); Rives, *Memorial of George Bancroft* (New York, 1892); Schuyler, *Correspondence and Remarks upon Bancroft's History of the Northern Campaign of 1777* (New York, 1867); Wallis, *Mr. Bancroft as an Historian* (Baltimore, 1896); West, *George Bancroft* (New York, 1900). Also the monograph, "A Little More Light on Andrew Johnson," by Prof. William A. Dunning, setting forth the claim that Bancroft wrote the inaugural message and other papers of Andrew Johnson (q.v.). This monograph was published in the *Proceedings* of the Massachusetts Historical Society for November, 1905, and was separately printed at Cambridge in that year. *Life and Letters of George Bancroft* (ed. M. A. DeW. Howe, Boston, 1908) is biographically of the first importance.

**BANCROFT,** HUBERT HOWE (1832–1918). An American historian, born at Granville, Ohio. After entering the book business in Buffalo, N. Y., he was sent to California in 1852 to establish a branch there. He became interested in the history of the Pacific coast and collected documents of all sorts relating to it. His business prospering, he practically retired in 1868 and gave himself up to historical work on a large scale, employing numerous assistants to explore and index his vast collection. He preserved a great mass of material on all phases of the history of the Pacific region, and in 1900 he presented no fewer than 60,000 volumes to the University of California, with about 500 original manuscripts, relating to the pioneer history of the coast. With the aid of his collaborators, he published during the period 1875–87 a monumental "West American Historical Series," 39 volumes in all, covering not only the history of 12 Western States, but that of Central America, Mexico, British Columbia, and Alaska. In addition the complete work includes 5 volumes on *The Native Races of the Pacific States*, and 2 volumes on *The Northwest Coast*. Among other of Bancroft's writings are: *Popular Tribunals* (2 vols.); *Chronicles of the Builders of the Commonwealth* (7 vols., 1891–92); *Essays and Miscellany* (1890); *Some Cities and San Francisco* (1907), and *The Book of Wealth* (1910). An account of his labors is given in *Literary Industries* (1890), continued in *Retrospection, Personal and Political* (1912).

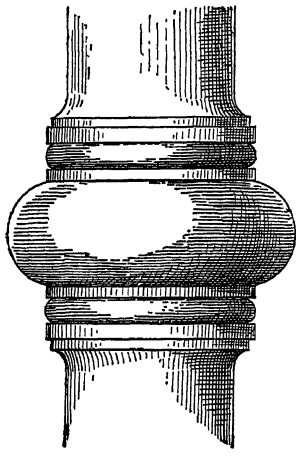
**BANCROFT,** MARIE EFFIE WILTON, LADY (1840–1921). An English actress and manager. She was born at Doncaster, and as a child appeared on the stage with her parents, who were both actors. Among her early parts was that of Fleance in *Macbeth* (1846). After several years in the provincial towns she made her London début, Sept. 15, 1856, at the Lyceum, as the boy Henri, in *Belphegor*, playing the same night in *Perdita; or, the Royal Milkmaid*. She won great popularity in several boy characters, in burlesques at various theatres, as Cupid in two different plays, and notably as Pippo, in the *Maid and the Magpie*, by H. J. Byron, at the Strand Theatre (1858). For several years she remained at the Strand, taking numerous parts of the same general type. In April, 1865, she began, in partnership with Mr. Byron, the management of the Prince of Wales's Theatre, having secured as a leading actor Squire Bancroft (q.v.), whom she had met shortly before in Liverpool. The house soon became noted for its series of successful comedies by T. W. Robertson, realistically depicting certain features of the social life of the day and staged with unusual attention to naturalness of detail. In successive years they brought out *Society* (1865), *Ours* (1866), *Caste* (1867), *Play* (1868), *School* (1869), and *M. P.* (1870). Miss Wilton, who in 1867 became Mrs. Bancroft, regularly took the principal female parts in these pieces, her husband being leading man. Some of her best-known rôles were Mary Netley, in *Ours;* Polly Eccles, in *Caste;* and Naomi Tighe, in *School;* and also Lady Teazle in *The School for Scandal* (revived 1874); Zicka, in *Diplomacy* (1878); and Nan, in *Sweethearts* (1879).

Mr. and Mrs. Bancroft likewise presented at their theatre a number of prominent actors, among them Hare, Coghlan, the Kendals, and Miss Terry. In 1880 they moved to the Haymarket Theatre, a larger house, where they continued the successful presentation of modern comedy. July 20, 1885, they retired from the stage, and very rarely appeared afterward, though in 1893 Mrs. Bancroft took part with her husband (who was knighted in 1897) in the revival of *Diplomacy* at the Garrick Theatre. She collaborated with her husband in the production of two volumes of reminiscences called *Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves* (London, 1888), and *The Bancrofts: Recollections of Sixty Years* (London, 1909). She is also the author of the novel, *The Shadow of Neeme.*

**BANCROFT,** Richard (1544–1610). An English prelate and Archbishop of Canterbury (1604–10). He was born at Farnworth in Lancashire and was educated at Cambridge, where he graduated B.A. in 1567 and M.A. in 1570. In 1575 he became rector of Fenersham and from this time on became more and more recognized as the leader of the strictly Anglican party as against Puritans on the one hand and Roman Catholics on the other. His opportunity came in the series of attacks on the Anglican church known as the Marprelate Tracts. These he combated by two methods: reply through numerous tracts which he himself wrote or caused others to write; and through bringing offenders to trial before the Ecclesiastical Commission Court, of which he became a member about 1587. In addition to this he delighted the High Church party by a sermon on Feb. 9, 1589, in which he asserted the divine right of bishops and urged the theory of the apostolic succession. His progress was rapid, and he became Bishop of London in 1597 and in this capacity attended the deathbed of Elizabeth. At the accession of James I he did his best to prevent any alliance between the crown and Puritanism and at the Hampden Court Conference (1604) urged the cause of Anglicanism with intemperate zeal. The same year he succeeded in passing through Canterbury Convocation a series of canons aimed at Puritanism which forced many clergymen to give up their livings. Their cause, however, was taken up by Parliament, and for the rest of Bancroft's life a constant struggle was waged between the Puritan Parliament and the archbishops. Not content with this, he involved himself in a struggle with the courts of common law over the rights of the church courts. The balance of his time was spent in the more peaceful work of translating the Bible, of which work he was "Chief Overseer" and which resulted in the "Authorized Version" published the year after his death. He died Nov. 12, 1610. Bancroft was in no sense a lovable person, but the Anglican church undoubtedly owes, in a large measure, her present constitution to this able combative Bishop. Consult Usher, *The Reconstruction of the English Church* (New York, 1910).

**BANCROFT,** Sir Squire Bancroft (1841–1926). An English actor and manager, born in London. He began his dramatic career in Birmingham in 1861. After playing in Dublin and Liverpool he was invited to London by H. J. Byron and Miss Wilton, and made his first appearance at the Prince of Wales's Theatre, in April, 1865. His subsequent history is in constant connection with that of Miss Wilton, whom he married in December, 1867. (See Bancroft, Marie.) He continued with Mrs. Bancroft in the management of the Prince of Wales's Theatre and, after 1880, the Haymarket, till July, 1885, when they retired together. After that his chief appearances were at the Lyceum in *The Dead Heart*, with Irving (1889), and in February, 1893, at the Garrick, in *Diplomacy*. He was knighted in 1897. Consult *Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves* (London, 1888), and *The Bancrofts: Recollections of Sixty Years* (London, 1909).

**BANCROFT,** Wilder Dwight (1867– ). An American chemist, born in Middletown, R. I. He graduated at Harvard in 1888 (A.B.), and did four years of special work in Strassburg, Leipzig, Berlin, and Amsterdam (1889–93). In 1892 he was given the degree of Ph.D. at Leipzig. He was assistant in chemistry at Harvard in 1888–90, instructor in chemistry there in 1894–95. He was assistant professor of physical chemistry at Cornell in 1895–1903, when he became full professor. In 1905 he was elected president of the American Electro-Chemical Society, and in 1910 of the American Chemical Society. He founded and became editor of the *Journal of Physical Chemistry* in 1895. His publications include *The Phase Rule* (1897).



BAND OF A COLUMN.

**BAND** (from *bind*). In architecture, the word is used in two senses: (1) to designate any ring or collar encircling a round feature, as a shaft or tower; (2) to designate any flat architectural member continued horizontally along a wall or other part of a structure, such as a flat stringcourse or a frieze. In Gothic, especially English-Gothic architecture, the long shafts of pier clusters are often interrupted by one or two molded bands or shaft rings, and these occur also in Byzantine and Moorish architecture. One of the finest of classic bands is the famous anthemion band of the Erechtheum at Athens.

**BAND.** Originally the term "band" had general reference to any combination of instruments organized for the performance of instrumental music, in which sense it is still largely employed in England. In modern technical usage it refers only to such combinations of instruments as are usually played on the march. Up to the twelfth century there had been no attempt at musical organization on the part of wandering or roving musicians—a condition due as much to the evil repute in which they were held as to the unsuitable character of their primitive instruments. About the thirteenth century conditions had so far improved that recognition and sanction were conceded them, and bands of pipers and trumpeters came into existence,

So seriously did they value their art after this that guilds were formed, the members of which elected a head or piper king, who, in common with the rank and file of the membership, was pledged to see "that no player, whether he be piper, drummer, fiddler, trumpeter, or performer on any instrument, be allowed to accept engagements of any kind, whether in towns, villages, or hamlets, unless he had previously enrolled himself in the guild." The original guild was probably that of the Brotherhood of St. Nicholas, organized at Vienna in 1228, which 100 years later was placed under the control of a regularly appointed board nominated by the Austrian government. From these guilds town bands were formed throughout Germany and Austria, consisting for the most part of fifes, flutes, schalmey, bombard, zinkers, or cornetti (six-holed horns, similar in shape to a cow's horn, and played with a special mouthpiece), bagpipes, viols, and drums. The development of the wind band (brass, wood wind, and reed instruments) was curiously influenced by the peculiar restrictions defining the social status of every calling during the Middle Ages. Thus, the trumpets and kettledrums were reserved exclusively for the nobility and forbidden to ordinary minstrels. In some towns stringent laws were passed forbidding bands of more than five or six pipers to play at an ordinary citizen's wedding, or other functions of similar importance; bands of greater strength, or the *full band*, being reserved for civic and religious occasions. The music played by such bands was learned by ear and rarely put into writing, in order to add effect to the supposedly secret nature of their order. Between the seventeenth and eighteenth centuries music began to be noted down, and the monotonous character of the band music (due to the impossibility of their horns and trumpets giving the third and seventh of the dominant chord) was largely done away with by adding a few trumpets tuned in other keys.

At the beginning of the eighteenth century instrumental music had separated very distinctly into the three or four great groups or divisions in which we find it to-day. The *full orchestra*, combining every element and vehicle of musical expression, addressed itself to the musical intellects; while the *brass band* retained its mission as church and community music, especially for rendering chorales in the open air, and the *military band* appealed to the masses at large. The bands of to-day may be grouped as follows: (*a*) drum and fife, or drum and bugle; (*b*) brass band; (*c*) military band. Drums, fifes, and bugles or trumpets have remained practically unchanged, and are now, as they always have been, inseparably connected with all that pertains to the life of the soldier. The brass band has ever been closely connected with the services of the Church, and in England has reached its highest development through the numerous workingmen's band organizations of Lancashire and Yorkshire. Such bands as *Besses-o'th'-Barn*, *Stalybridge Old Band* (under Alexander Owen, a celebrated leader), and similar bodies, in many instances composed entirely of coal miners or factory operatives, have been reckoned among the most potent influences in the modern development of music among the masses of England. Brass bands are met with in the United States, but only where military bands are not possible.

The military band as a musical organization (as a regimental or military feature, it will be found treated under BAND, MILITARY) is the modern representative of the original town band. The first French military bands, organized by Lully (q.v.) under the commission of Louis XIV, consisted of a quartet (soprano, alto, tenor, and bass) of oboes, with regimental drums, for all of which he wrote separate parts. The music of the town bands was performed by all the instruments in unison. Queen Elizabeth's band had consisted of 10 trumpets and 6 trombones, besides a few other instruments. The Lully of the Germans was a civilian musician named Wieprecht, who, because of severe opposition, succeeded in getting his scheme of instrumentation introduced into but a single Prussian regiment. Sax (q.v.) of France succeeded in the introduction of similar reforms in the army of Napoleon III. The invention and rapid improvement of the clarinet marked a new era, and it became as important and essential a feature of the military band as is the violin to the orchestra. Next followed the invention of the bassoon (or *fagotto*) and French horns. The saxophone family (B flat soprano, F flat alto, B flat tenor, E flat barytone, and B flat bass), although practically the invention of the French bandmaster Sax, have only within the last few years become common to military bands generally.

The modern *concert military band* may be described as a result of the following causes: (1) a development of the brass band; (2) a desire to give more complete artistic expression to the increasing repertoire of band music; (3) the prominence given to the wind band, in the composition of the great modern orchestral composers. To the latter cause, and to the easy transition from orchestra to band of most modern orchestral compositions, may be indirectly attributed the great increase of the woodwind section of the concert band—flutes, oboes, clarinets, and contrabassoons (*contra fagotti*). An instance of this may be found in Wagner's "Elizabeth's Prayer," where the wood winds are used alone. Similarly, in many of the most beautiful passages of the Nibelungen music, the strings are not used at all. The reflex influence of such music on the concert band has been to cause the invention and introduction of new instruments, in order to secure the desired tone color. The military concert band has received its greatest impetus in the United States, where it may be said to have been inaugurated in the Fourth of July concerts given by the Boston city government as a feature of the regular Independence Day celebration usually held on the historic Common. The series of promenade concerts which followed met with remarkable success, and brought Patrick Sarsfield Gilmore (q.v.) into prominence as a bandmaster. D. W. Reeves succeeded Gilmore at the latter's death, but soon resigned in favor of Victor Herbert, who is held to have rivaled John Philip Sousa (q.v.) in the advancement of the military band. The organization known as Sousa's Band, marked at the beginning of the twentieth century what was universally regarded to be the highest type of concert military band. Sousa, who had attained national eminence in connection with the United States Marine Band at Washington, resigned his position in order to devote himself to concert work entirely, with a band whose membership was as carefully recruited as that of the great orchestras. The

band of the French Garde Républicaine was his model, and he has succeeded in placing his organization at the head of the concert bands of the world.

**Band Instrumentation** for brass, military, and concert bands is as follows: *Brass* (if of 10 pieces), E flat tuba, barytone, 2d alto, B flat tenor, E flat cornet, 1st alto, 2d B flat cornet, 1st B flat cornet, bass drums and snare drum. For a band of 20 pieces the following instruments are added: 1 solo, A flat cornet, and 2 1st B flat cornets; 1 3d B flat cornet; 1st, 2d, and 3d trombones, and 1 B flat bass. The average military band is composed as follows: 2 1st B flat clarinets; 2 seconds, and 1 3d B flat clarinet, 1 piccolo, 1 E flat clarinet, 2 1st B flat cornets, 1 2d and 1 3d B flat cornets, 1st, 2d, and 3d altos, 1st, 2d, and 3d trombones, oboe, glockenspiel, saxophones (occasionally), barytone, B flat bass, E flat tuba, bass drum and snare drum. The concert military band includes such additions to the regular military band as are demanded by the programme undertaken. String bass, glockenspiel, saxophones, contrafagotti, and tympani are invariably added. Consult A. A. Clappé, *The Wind Band and its Instruments* (New York, 1911).

**BAND, MILITARY.** In the army service, an organized body of musicians, instrumentalists, under a bandmaster or chief musician, generally assigned to each regiment of cavalry and infantry, and to the headquarters of the branches of the service. Military bands of one form or another are coeval with military bodies themselves. Every ancient nation had its peculiar music, instruments, and national songs. If tradition assigns the reed, lute, and string to the shepherd and herdsman, it is no less the authority for imputing the jarring instruments of percussion and strident brass to men of war. Ancient songs referred invariably to great victories, memorable sieges, and valorous deeds, and were sung in camp and on the march. With the Spartans the song of Castor was the signal for combat; the Romans charged to the musical accompaniment of trumpets and horns; while the ancient Germans preferred the more complex aggregation of drums, flutes, cymbals, and clarions. At the beginning of the period of the Middle Ages the instruments handed down and preserved by most European nations were those used in the rallying of troops, calling them to battle, or enlivening a fatiguing march with the few crude melodies of which they were capable.

In France the minstrels and troubadours greatly aided instrumental progression. They would frequently accompany the troops on the march and to battle, having as instruments the rebec, a small, three-stringed violin; the bagpipe, and the flute, or fife, to which, in 1330, was added the clarion. The cornet, another war instrument of the ancients, made its appearance about the same time. Towards the end of the fifteenth century regularly organized military bands began to make their appearance, their collection of instruments comprising drums and trumpets principally, which, in the case of the Italian bands, was further augmented by the pandean pipes, together with the flute and fife. The drummer used a single stick. Bagpipes and violins were added about the beginning of the sixteenth century, the invention of the former instrument belonging to the Alps or Piedmontese inhabitants.

The Swiss mercenaries, in 1535, introduced into France the combination of fife and drum, which has ever since and in nearly every land been the popular musical vehicle for the expression of martial spirit.

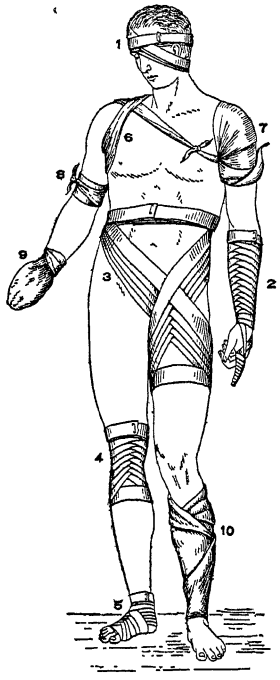
In the seventeenth century the Prussians introduced the hautboy, which was given to the dragoons and musketeers of the Guard. To the Eastern nations, through the Hungarians, we owe the kettledrums, bassoon, and true flute; to the Italians the tambourine; to the Hanoverians the modern horn; and to the Turks the cymbals and big drum. The entire musical scheme of military bands at the beginning of the eighteenth century was a combination of all these instruments, with the addition of the cavalry trumpet. The average infantry band consisted of drums, fife, horn, bassoon, big drum, and cymbals; the cavalry bands of hautboy, bagpipe, and kettledrums. The bassoon, hautboy, horn, and trumpet, however, were indifferently employed by both troops. A French ordinance dated April 19, 1766, appoints a band of music to each regiment. New instruments making their appearance are: the clarinet (q.v.), which, however, is not incorporated into the band until 1755; the serpent, triangle, and trombone, each entering successively and from different sources. Practically it was not until 1792 that military music and military bands began the development that has brought them to their present high state of efficiency. In England officers hired civilian musicians to act as the band of their respective regiments—a system which obtained until the foundation of Kneller Hall (q.v.) in 1857; but in France and Russia bands were part of the army organization. About this time the individual bandmaster becomes prominent as the great factor of progress, among the most important of whom must be placed the famous Neithardt, born Aug. 10, 1793, who, when still a young man, was for two years bandmaster of the Garde-Schützen Battalion, and afterward for 20 years the bandmaster of the Kaiser-Franz Grenadiers. This latter band he brought to a high state of perfection. Progress in England must be credited largely to Charles Godfrey, born 1790, who in 1813 joined the band of the Coldstream Guards as a bassoon player, became bandmaster, and remained such until his death in 1863. In the United States Patrick Sarsfield Gilmore (q.v.) was the moving spirit. His first band was organized in Boston, 1859, but shortly afterward he became a bandmaster in the Federal army, serving throughout the Civil War, and becoming world-famous for the novel effects he produced in military music. Bands in the United States army are recruited generally for that specific purpose, the members being enlisted men, and usually consist of 28 men, all ranks. (For their pay, see PAY AND ALLOWANCES.) Instruments are supplied by the Quartermaster's Department. There is a school for army bands at Governor's Island, N. Y., which is more or less experimental in character, but it is hoped that a permanent school for training young men and boys for bands of the United States army will be developed from it, the scheme employed in England being the prospective plan.

In England bandmasters are specially trained at Kneller Hall, and on appointment receive warrant rank, with pay at 5 shillings per day, and £70 per annum from the band fund. The men are generally recruited as boys, from 14 to 16 years of age, usually from military institu-

tions, schools, and training ships. The official establishment of British army bands is 31 all told for infantry, and 23 for cavalry; but without exception this number is greatly increased at the personal expense of the officers of the regiments, who pay for all extra men, music, and instruments. A thoroughly trained, fully equipped, numerically strong band is often a point of regimental rivalry, and while it has succeeded in endowing the British army with the best bands in Europe on an average, it has been done only at the expense of officers, already financially overtaxed. The following bands are considered among the leading military bands of Europe: the Royal Artillery, Royal Marine, and Guards Band, of England; the Kaiser-Franz Grenadier Band, of Germany; the Guides Band, of Belgium; the Garde Républicaine Band, of France; the Imperial Guards Band, of Austria; the Ottoman Palace Band, of Turkey; the Bersaglieri Band, of Italy; the Czar's Regiment of Guards Band, of Russia.

For fuller details the reader is referred to *United States Army Regulations* for composition and equipment of United States army bands; Grove, *Dictionary of Music* (London, 1894), for biographies of military music composers and bandmasters; and the article "Militärmusik," by Rode, in the *Musikalisches Conversations-Lexicon* (Berlin, 1877).

**BAN'DAGE** (Fr. from *bande*, a strip; cf. BAND). A strip of woven material used by surgeons to apply pressure on a part or to re-




BANDAGES APPLIED.

Roller Bandages: 1, eye; 2, finger, wrist, and forearm; 3, groin; 4, knee-cap; 5, foot and ankle. Triangular Bandages: 6 and 7, shoulder; 8, upper-arm; 9, hand; 10, leg.

tain dressings upon wounds. The most common bandage is a strip of linen, flannel, muslin, or cheese cloth, from 1 to 5 or more inches in breadth and 10 yards long, rolled longitudinally: the roller bandage. It is applied to a limb in a spiral, each turn overlapping the preceding about one-third of its width and adjusted to tapering or enlarging parts of the limb by reversing the bandage, or turning it back upon itself. It must be applied smoothly, so as to exert even pressure. A "figure-of-eight" bandage is often used in the neighborhood of joints, the turns crossing each other in a way to resemble that numeral. The "spica" bandage, so called from its supposed resemblance to the arrangement of the husks of an ear of corn, is applied at the junction of a limb with the body; 3, in the figure, illustrates a spica of the groin. There are also bandages to suit special purposes, as the four-tailed for the head or knee, which consists of a piece of cloth split up on each side towards and nearly to the centre. When applied, the tails are crossed and tied so as to make an extemporaneous nightcap. In the packets supplied to soldiers of the German army and to members of an ambulance corps, as well as to members of "first aid to the injured" societies, are large handkerchiefs, to be used as triangular (Esmarch) bandages, slings, or, when folded, short roller bandages. Roller bandages of crinoline, rubbed full of fresh plaster of Paris, are used in making plaster splints in case of fracture, etc. They are thoroughly wet first and then applied rapidly. Starch, silica, and dextrin bandages are used in much the same manner to secure stiff and immobile dressings. India-rubber bandages are employed, on the other hand, where a flexible support is required, as in varicose veins of the legs.

**BANDAI-SAN,** bän-dā'ē-sän' (Jap. Bandai mountain). A volcano of Japan, situated near the centre of the island of Nippon (Map: Japan, F 5). It consists of a number of peaks, none of which exceed a height of 6000 feet, situated around an elevated plain, on the northern side of Lake Iwanashiro. The last eruption of the volcano occurred on July 15, 1888, when a tremendous mass of earth and rock was thrown out by the explosion of one of the craters, Ko-Bandai-san, and rolled down the mountain slopes into the Nagase valley, devastating an area of over 27 square miles and killing 461 people.

**BANDA** (bän'dȧ) **ISLANDS.** A group of several small islands of the Dutch East Indies, in the Moluccas (q.v.) south of Ceram and attached to the residency of Amboina (Map: Australasia, E 3). The two largest islands are Banda Neira and Lontor. Gunong Api, the highest island, is an active volcano 2200 feet above the sea, constantly emitting vapor and sometimes doing great damage. Only a few of the islands are inhabited. Their total area is about 17 square miles, and the main products are nutmegs and mace. The capital is Banda, on Banda Neira. It is well fortified and has a good harbor. The population of the islands is about 9500, of whom about 500 are Europeans. The Banda Islands were discovered in 1512 by the Portuguese, who were dispossessed by the Dutch in the seventeenth century. Since then they have shared the fortune of the other Moluccas. Consult Warburg, *Ein Beitrag zur Kulturgeschichte der Banda-Inseln* (Leipzig, 1897).

**BANDAN'A** (Hind. *bāndhnū*, from the dyeing of wares with those parts tied [*bāndh*, cord, tie, band] that are to remain undyed). A printed handkerchief, originally of Indian origin and manufacture and usually made of cotton, though real Indian bandana silks and handkerchiefs are

occasionally seen. The cloth is first dyed turkey-red, and then the pattern is made by discharging the color with bleaching liquor in a hydraulic press. The pattern to be discharged is cut out on two plates of some metal, such as lead, which is not acted on by the liquor, the plates being the full size of the handkerchief. A dozen or more handkerchiefs are put in at once between the plates, and so many of these courses are entered together as will fill the press. Then the pressure is applied, and the liquor is run in on the uppermost plate, which is grooved on the upper side to receive it, and holed to pass it from plate to plate through all the cloth folds in the press. The pressure on the cloth to make clean work by preventing the spreading of the liquor is enormous. The patterns in the real bandana style of printing are spots and diamond prints, the best suited for discharging, and even for these a pressure of 500 tons is required to work them clean.

**BANDA ORIENTAL,** bän'dȧ ō'rē-ĕn-tăl' (Sp. eastern bank). A name once locally used to designate the republic of Uruguay, which is on the east side of the Uruguay River.

**BANDEL,** bän'dĕl, Ernst von (1800–76). A German sculptor. He was born at Ansbach and studied at the Munich Academy. After some years in Nuremberg and Rome he returned to Munich, where he carved portrait busts. In 1834 he went to Hanover and undertook, among other larger works, the colossal statue of the German hero Hermann or Arminius at Detmold, to which he devoted the best years of his life and a large part of his own resources. In 1871 the Imperial government contributed 10,000 thalers to the work, and the statue was unveiled in 1875, the sculptor receiving a pension of 12,000 marks in recognition of his devoted services. Although Bandel was educated in the classic school, he nevertheless endeavored to free himself from its influence, as well as to hold himself aloof from the Romantic tendencies of his day. His aim was to found a national school of sculpture based upon naturalism, but his individuality was not sufficiently powerful to break the bonds of classicism. Consult his own monograph, *Die Arminsäule* (Hanover, 1861), and his biography by Schmidt (Hanover, 1892).

**BANDELIER,** bän'de-lēr', Adolph Francis Alphonse (1840–1914). An American archæologist, born at Bern, Switzerland. He traveled under the direction of the Archæological Institute of America in New Mexico, Arizona, Mexico, and Central America, 1880–85, and went in 1892 to Peru, Bolivia, and Ecuador, under commission of Henry Villard. For several years he continued researches in the last-named countries in behalf of the American Museum of Natural History in New York City, whose important collection of Bolivian and Peruvian antiquities he made. In 1904 he was appointed lecturer in American Archæology at Columbia University and served until 1911. Among numerous other works of investigation he published *The Art of War and Mode of Warfare* (1877); *Archæological Reconnaissance in Mexico* (1881); *Final Reports of Investigations among the Indians of the Southwestern United States, 1880–85* (1890–92); *The Gilded Man (El Dorado) and Other Pictures of the Spanish Occupancy of America* (1893); *On the Relative Antiquity of Ancient Peruvian Burials* (1904); *The Indians and Aboriginal Ruins of Chachapoyas, Peru* (1907); *The Islands of Titicaca and Koati* (1910).

**BANDELLO,** bän-dĕl'ō, Matteo (c.1485–c.1560). Next to Boccaccio, the most widely known of all the Italian writers of *novelle*, or tales. He was born at Castelnuovo in Piedmont, educated at a convent in Milan, and in early life became a Dominican monk. After several years of wandering through the courts of the south, he settled at Mantua (1515), where under the patronage of the Gonzaga family he made many powerful friendships. In 1521 he returned to Milan, where he remained till 1526, when his connection with the Morone conspiracy forced him to flee. At first secretary to Luigi Gonzaga, he served from c.1528 to 1541 as adviser of Cesare Fregoso. After the murder of the latter he accompanied Fregoso's wife to France. Her influence in 1550 procured him the bishopric of Agen, which he held till 1554. He continued for the rest of his life in France. Not to consider his *Rime* (1537), dedicated to his idealistic love for Lucrezia Gonzaga, and his 11 cantos of *Lodi* (1545) in her honor, Bandello's most important work is his *Novelle* (vols. i–iii, 1554; vol. iv, 1573). These tales belong to the type made familiar by the still more famous collections of the *Decameron* and the *Heptameron*, and have their origin in the conversations which Bandello attended in the long course of his social life. They deal with the tales made familiar in the French *fabliaux*, with popular traditions and anecdotes, historical episodes, the events of current life; and are narrated in a simple conversational style, much as they were actually told in intimate social intercourse. Bandello has little psychological penetration and no power over the comic, but he has a marked sense for the picturesque and a naïve interest in the strange and fantastic. Together with the introductory notes, which describe the occasions on which Bandello heard the tales, his stories give valuable insight into the social life and manners of his time. He narrates, among others, the story of Romeo and Juliet, though Shakespeare probably derived his plot from another source. His work has been used extensively by Lope de Vega, Massinger, and Byron. Consult E. Masi, *M. Bandello o vita italiana in un novelliere del' 500* (Bologna, 1900). The tales were translated by J. Payne (London, 1890); the best edition of the *Novelle* is that of Brognoligo in 6 vols. (Bari, 1910–12).

**BANDE NOIRE,** bänd nwär (Fr. black band). The name given in France after 1815 to those speculators who had bought up, at ridiculously low prices and in depreciated currency, the lands and houses confiscated from the Church and the émigrés during the Revolution. The opprobrious name was fixed on them on account of their vandalism in the destruction of magnificent works of art, churches, convents, and chateaus for the sake of the building material. It has, however, been affirmed that these men did considerable service to the community in removing old and useless edifices, and that their minute subdivisions into lots of the old territorial domains has favored agriculture and ameliorated the condition of the people. Consult Lavergne, *Economie rurale de la France* (Paris, 1877).

**BAN'DEROLE** (Fr., It. *banderuola*, a little banner, dimin. of *bandiera*, banner). A small streamer fixed immediately under the crook, on the top of a staff of a crozier and folding over

the staff. Also an architectural term for the flat inscribed band used in the Renaissance buildings, similar to those now used for mottoes on coats of arms.

**BANDETTINI,** bän'dĕt-tē'nē, TERESA (1763–1837), called also in the academies AMARILLA ETRUSCA. An Italian *improvvisatrice,* born at Lucca, whose beauty, wit, and skill at extempore versifying made her famous in the academies of Italy and won her the laurel crown of poetry in Rome (1794). She was a friend of Monti and Alfieri and of the leading people of the day.

**BAND FISH.** One of the several greatly compressed and much elongated marine fishes, principally of the family Cepolidæ. The red band fish (*Cepola rubescens*), about 15 inches long, dwells in the Mediterranean, where, on account of its brilliancy, it is sometimes known as the "fire-flame" and "red-ribbon." Species also occur in Asiatic waters, inhabiting quiet depths, where they are free from the action of the waves, feeding on seaweed and small shellfish. The name is also sometimes applied to the oarfish (q.v.).

**BANDHOLTZ,** HARRY HILL (1864–1925). An American soldier, born at Constantine, Mich. After graduating from the United States Military Academy in 1890 he rose steadily through the various grades, serving as major of volunteers with the Seventh Infantry in the Santiago campaign of the Spanish-American War, and as captain with the Second Infantry in the Philippine insurrection campaigns. In 1901–02 he was governor of Tayabas Province, and afterward he became assistant chief of the Philippine constabulary, in command of the district of southern Luzon. In 1907 he was promoted to be brigadier-general and chief of the Philippine constabulary. In the discharge of his duties he captured or destroyed various outlaw bands and their chiefs, the last of whom he successfully subdued in 1911.

**BAN'DICOOT** (a corruption of the Telugu word *pandi-kopper,* meaning 'pig-rat'). A member of the marsupial genus *Perameles,* included in the family Peramelidæ. The species are not numerous, about 12 in all, and are scattered through Australasia. The muzzle is long and pointed and the head shrew-like. Much of the day is passed in burrows in which they make nests of grass and leaves. They feed both on insect food and vegetables. Their powerful claws enable them to dig up roots with ease, and they frequently do great damage to the gardens of the outlying settlements. The pouch opens backward and has accommodation for six or eight young. The long-nosed bandicoot (*Perameles nasuta*) is about 20 inches long, including a 5-inch tail. "It has ears like a rabbit, a long, sharp nose like a shrew, hind quarters like a kangaroo, and tail like a rat."

The closely related rabbit bandicoots consist of two Australian marsupials of the genus *Peragale.* The best-known form (*Peragale lagotis*) is known in its western Australian home as "native rabbit," from its enormous ears. The form, gait, and even the flavor of the flesh are rabbit-like. It burrows in the soil for grubs and also feeds on grass and vegetables. The pig-footed bandicoot (*Chœropus costanotis*) is the only member of its genus. It differs from other bandicoots and resembles a pig in having but two functional toes on each foot. It is small in size and omnivorous.

**BAN'DICOOT RAT.** The largest-known species of rat (*Nesokia bandicota*), a native of India and Ceylon, where it is also known as Malabar rat and pig rat, the latter being the significance of the Telugu word of which *bandicoot* is a corruption. Its body often exceeds a foot in length, the tail being of equal length. It is black above and grayish beneath, and the long tail is very thick at the base. It frequents arid, hilly districts, where its flesh is a favorite article of food with the coolies and is said to be delicate in flavor and to resemble young pork. It feeds chiefly on grain and roots and is very destructive to gardens and to poultry, burrowing under walls to reach what it wants. "Its nests, when rifled, are frequently found to contain considerable quantities of rice, stored up against the dry season." It is not known north of the Ganges and Indus. Other species of the genus extend from Palestine to Formosa.

**BANDIERA,** bän-dyā'ra, ATTILIO and EMILIO (1817 and 1819–44). Italian patriots. The two brothers came of a noble Venetian family; their father was an admiral in the Austrian service, and they themselves were officers of rank in the navy. Out of zeal for the cause of Italian independence, they entered into conspiracies against the Austrian government and carried on a correspondence with Mazzini, their idol, who was then in exile in England. In 1844 they were forced to flee to Corfu, whence they returned in the hope of stirring up an insurrection in Calabria. They were betrayed to the police authorities and, with seven of their companions, captured as soon as they had landed. On July 25, 1844, they were shot in the market place of Cosenza, while singing patriotic hymns and exclaiming "Viva l'Italia!" The death of the two noble youths aroused the hatred of Liberal Europe against the Austrian tyranny in Italy and prepared the way for the first movement of liberation in 1848. Consult Ricciardi, *Storia dei fratelli Bandiera e consorti* (Florence, 1863).

**BANDINELLI,** bän'dē-nĕl'lē, BARTOLOMMEO, or BACCIO (1488–1560). An Italian sculptor. He was born at Florence and was a pupil of his father, Michelangelo di Viviano, an able goldsmith, and of Rustici. He imitated the works of Michelangelo, whose "David," symbolic of Florentine freedom, he, the protégé of the Medici, attempted to surpass with a "Hercules and Cacus" (1534), placed like it in front of the Palazzo Pubblico. Ugly and exaggerated in form and sentiment, this group succeeded only in making its author the object of satire and ridicule. But Vasari's generally accepted charge that Bandinelli destroyed Michelangelo's famous cartoon of the "Bathing Soldiers" is probably due to that author's dislike of him. Through his industry many Italian cities were adorned with his statues and river gods, but their treatment was so commonplace that they failed to elevate or inspire public taste. His best work is to be found in the marble choir screen of the cathedral at Florence, wherein he has personified, in relief, figures of the virtues and figures of prophets and apostles. There is grace in their conception, and they are intelligently arranged as to the space at command. In the choir of the Annunziata at Florence is a group representing "Nicodemus Supporting Christ"; the Nicodemus is a portrait of Bandinelli himself. His other works include "Adam and Eve" and "Bacchus" (National Museum, Florence).

**BAND OF HOPE UNION.** The most important of the children's temperance societies

of England, started with local unions in 1847. In 1855 the United Kingdom Band of Hope Union was formed, and later the Edinburgh, Scottish, and Hibernian unions. With the income derived from small weekly dues, they maintain lectures, agents, a publishing department, fêtes, and concerts. Illustrated lectures are given in elementary and common schools, institutions, reformatories, and workhouses. Children over seven years old may belong. The latest statistics indicate that there are over 15,000 Bands of Hope and juvenile temperance societies in Great Britain, with a membership of about 2,000,000. See TEMPERANCE.

**BAN'DOLIER'**, or **BANDOLEER** (Fr. *bandoulière*, It. *bandoliera*, shoulder belt; cf. *band*). A cartridge belt, worn over the shoulder; strongly made of stout canvas cloth, with a separate pocket for each cartridge or round of ammunition. It was extensively used by the colonial troops of Great Britain and portions of the mounted infantry, and officers armed with the revolver, during the Boer War of 1899–1902. The first use of the bandolier as an article of military equipment dates back two centuries, when muskets were provided with matchlocks. The musketeers were furnished with gunpowder in small cylindrical boxes made of wood, tin, or leather, each containing sufficient for one charge. Twelve of these little boxes were fixed to a belt called a bandolier, worn over the left shoulder. Ammunition for the rifle is issued to troops of the United States army in bandoliers, each containing 60 rounds. Each bandolier is fitted with a sling suitable for carrying it over the shoulder. The bandoliers are packed in moisture-proof containers, each holding 20 bandoliers filled with cartridges.

**BAN'DON**, or **BAN'DONBRIDGE**. A town in county Cork, Ireland, on the Bandon, 20 miles by rail southwest of Cork (Map: Ireland, C 5). Bandon was at one time a prosperous manufacturing town, with extensive cotton-spinning and weaving industries, which now have almost entirely disappeared; a considerable grain and provision trade is carried on, and there are flour mills and breweries, but the population, which was 9049 in 1841, had diminished by 1911 to 3122. The country around Bandon is very beautiful, well wooded, undulating, and pastoral. The river described by Spenser as "the pleasantest Bandon, crowned by many a wood," has a course of 40 miles, 15 of which are navigable to Innishannon, 5 miles below Bandon.

**BANDONG**, bän'dông. The capital of the Preanger residency in Java, situated in the western part of the island, and connected by rail with Batavia (Map: East Indies, C 6). It contains a fine park and plain in front of the regent's residence, a school for native teachers, and a racecourse. The volcano of Guntur is near by. Pop., estimated at 21,200.

**BANDTKE**, bänt'ke, or **BANDTKIE**, bänt'-kye, JERZY SAMUEL (1768–1835). A Polish historian, philologist, and bibliographer. He was born at Lublin and was educated at Halle and Jena. From 1811 until his death he was librarian and professor at Cracow. He wrote several valuable works, among which may be mentioned *Polnisch-Deutsches Wörterbuch* (1806), *Polnische Grammatik für Deutsche* (1808; frequently reprinted), and *Dzieje narodu polskiego*, 'History of the Polish Nation' (1810; 3d ed., 1835).

**BANDY LEG.** See LEG.

**BANE'BER'RY.** See ACTÆA.

**BANÉR**, bä-nār', JOHAN (1596–1641). A Swedish general in the Thirty Years' War. He was born at Djursholm, near Stockholm, entered the army in 1615, and early distinguished himself in the wars against Russia and Poland. He accompanied Gustavus Adolphus to Germany in 1630 and was conspicuous in the battle of Breitenfeld (1631), in which he repulsed Pappenheim and largely contributed to the victory. He was left to oppose Aldringer in the west when the battle of Lutzen was fought (1632), and after the death of Gustavus Adolphus he assumed chief command of the Swedish army, invaded Germany with varying success, obtaining decisive victories at Wittstock (1636) and Chemnitz (1639). He failed in an attempt, in 1641, to capture the Emperor at Ratisbon and died soon afterward at Halberstadt. Consult C. F. Manderfeldt, *Eloge de Jean Banér, feldmarechal général pendant la guerre de trente ans* (Copenhagen, 1787), and Lundblad, *Johan Banér* (Stockholm, 1823).

**BANES**, bä'näs. A town on the north coast of Cuba, in the province of Santiago de Cuba, about 35 miles north by east of Holguin (Map: Cuba, K 6). It has an excellent harbor and is noted for its shipments of fruit, especially bananas.

**BANFF**, bämf. A seaport and the county town of Banffshire, Scotland, at the mouth of the Deveron, 50 miles by rail north-northwest of Aberdeen (Map: Scotland, F 2). It forms a higher or inland town, and a lower or sea town, on the Moray Firth. The town is very well built, and the streets are clean and well paved. Among the noteworthy buildings are Banff Castle, a handsome town hall with a lofty spire, and the academy, a fine building of classical style. There are a number of educational institutions, including a museum and several libraries. To the south of Banff is Duff House, the seat of the late Duke of Fife, with a large park. A seven-arched bridge over the Deveron unites Banff with the seaport of Macduff, on the right bank of the river. Manufactures include beer, and leather, wool, and iron goods. The chief exports are grain, agricultural products, cattle, salmon, and herrings. Banff, with Macduff, Elgin, Cullen, Inverary, Kintore, and Peterhead, sends one member to Parliament. Population, royal and municipal burgh, 1901, 3730; 1911, 3821. Its earliest-known charter was granted by Malcolm IV about 1163. Robert II in 1372 made Banff a royal burgh. Archbishop James Sharp was born here in 1618. Consult Cramond, *The Annals of Banff* (Aberdeen, 1891–93).

**BANFF**, bämf. A popular health and pleasure resort in southwestern Alberta, Canada, on the Bow River and on the Canadian Pacific Railroad (Map: British Columbia, F 4). The village (pop., 937 in 1911) is situated amid grand scenery of the Rocky Mountains and has a boiling sulphur spring, open-air swimming baths, a fine hotel, and a sanitarium, all included in the Rocky Mountain National Park of Canada (area, over 5000 square miles), of which Banff is the railway depot. Consult *Banff in the Canadian Rockies* (Montreal, 1900).

**BANFFSHIRE**, bämf'shēr. A county in the northeast division of Scotland, bounded north by the Moray Firth; east, southeast, and south by Aberdeenshire; west, by Elgin and Inverness shires (Map: Scotland, E 2). Its greatest

length is about 59 miles, its greatest breadth about 31, its extent of seacoast about 30; area, 630 square miles. The surface is mountainous, interspersed with fertile valleys and fine pastures. The soil in many parts is very fertile and highly cultivated. Agriculture and herring and salmon fisheries are the leading occupations. The chief towns and villages are Banff, Macduff, Keith, and Buckie. Pop., 1801, 35,807; 1851, 54,170; 1891, 64,190; 1901, 61,500; 1911, 61,402.

**BÁNFFY,** bän'fē, DESIDERIUS, BARON (1843–1911). A Hungarian statesman. He was born at Klausenburg, Transylvania, and educated at the universities of Leipzig and Berlin. He entered the government service and became prefect (*Obergespan*) of various counties of Transylvania. He was elected deputy and became President of the House of Deputies in 1892. On the resignation of the Wekerle cabinet in 1895 he was intrusted with the formation of a new Liberal ministry. He resigned both the premiership and his mandate as deputy in 1899, but reentered politics in 1903 as head of a new party advocating radical nationalistic views. He was a member of the coalition which brought parliamentary government to a standstill in 1905–06, but seceded in the spring of 1906. See HUNGARY.

**BANG,** bäng, BERNHARD LAURITS FREDERIK (1848– ). A Danish scientist, professor of pathology and therapy in the Royal Veterinary and Agricultural College at Copenhagen. He became widely known for his researches in veterinary science, and especially for his investigations into contagious abortion and tuberculosis. With Stribolt he discovered, in 1896, the cause of contagious abortion in cattle, and subsequently he studied its treatment and the possibility of immunization. In 1892 he originated the Bang method of eradicating tuberculosis from dairy herds by the isolation of the mildly affected animals and the artificial feeding of their calves with milk free from tubercle bacilli. This method has been extensively applied in Denmark, Sweden, and Norway, with favorable results. Bang is the author of a large number of articles in the veterinary and other scientific journals of the world.

**BANG,** HERMANN JOACHIM (1857–1912). A Danish author, a nephew of Olaf Lundt, born in the island of Seeland and educated at the Academy of Sorö and at Copenhagen. He wrote the following popular novels, tales, and romances: *Haablöse Slägter* (1880; Ger. trans., *Hoffnungslose Geschlechter*, 1900); *Fädra* (1883; dramatized as *Ellen Urne*, 1885); *Excentriske Noveller* (1885); *Stille Eksistenser* (1886); *Tine* (1889); *Under Aaget*, a collection of novels (1890); *Ti Aar* (Ger. trans., *Zehn Jahre*, 1891); *Teatret* (1892); *De fire Djaevle* (1895; Ger. trans., *Die Vier Teufel*, 1897); *Ludvigsbakke* (1896); *Det hvide Hus* (1898; Ger. trans., *Das weisse Haus*, 1902); *Vad Vejen*, considered his best novel (Ger. trans., *Am Wege*, 1898); *Udvalgte Fortaellinger* (1899); *Liv og Död* (1900; Ger. trans., *Leben und Tod*, 1901); *Englen Michael* (1902); *Joseph Kainz* (1910). Etta Federn published a collection of Bang's fiction in German in 1910.

**BANG,** PEDER GEORG (1797–1861). A distinguished Danish jurist and statesman. He was born at Copenhagen and in 1830 was appointed professor of law in the university there. He took an active interest in politics, rising from offices in his native city to be a national figure. Several times he was Minister of Agriculture and Minister of the Interior, and in 1854 he was made head of the cabinet. His highest post was that of Supreme Court justiciary. His two principal works are *Lærebog i de til den romerske privat Ret henhorende Disciplíner* (2 vols., 1833–35) and *Systematisk Fremstilling af den danske Procesmaade* (with J. C. Larsen, 5 vols., 1841–43). His uncle, Frederick Luding Bang (1747–1820), was a distinguished professor of medicine at the University of Copenhagen and author of a number of works on medical subjects.

**BANGALA,** bäng'gä-lä. A tribe of cannibal negroes on the Middle Congo. They are of warlike character and have furnished excellent troops to the Belgian Congo. See AFRICA.

**BANGALORE,** bäng'gä-lōr' (Hind. city of beans). A fortified town in the native state of Mysore, India, 70 miles northeast of Seringapatam, in lat. 12° 58′ N. and long. 77° 38′ E. (Map: India, C 6). It is the chief military station of the British in the territory, and the seat of the British resident. It has manufactures of cotton cloth and woolens, especially the latter. The place is more than 3000 feet above sea level and is remarkable for its salubrity, for the temperature seldom rises above 90° or descends below 61°. The municipal water supply is excellent, and European vegetables grow in abundance. The town is well laid out, has handsome public buildings, and beautiful botanical gardens. The most prominent structure is the Maharaja's palace. There are a number of European educational institutions, and the chief, the High School or Central College of the province, is well attended. The military cantonment, housing a large British and native force, is to the northeast. Bangalore dates from the foundation of its fort in 1537. It was a favorite residence of Hyder Ali, and in 1791 it was stormed by the British under Lord Cornwallis. Pop., 1891, 180,300; 1901, 159,000; 1911, 189,485.

**BANGE,** bänzh, VALÉRAND DE (1833–1914). A French colonel of artillery, who organized the present artillery system of the French army. He was born at Balignicourt. In 1873, as director of the *atelier-de-précision* in the Dépôt Central in Paris, he reconstructed both the light and heavy fieldpieces then in use, and the models he proposed in 1876 were adopted for the army in 1879. From 1882 to 1889 he was director of the Cail corporation, whose plants at Grenelle, Denain, and Douai he transformed into ordnance factories. He competed successfully with Krupp in 1884 for the contract to supply the Servian government with fieldpieces. Bange's gun was also preferred by England, Italy, and Sweden. For the Antwerp Exposition of 1885 he made a gun of 34 centimeters (about 13¼ inches) calibre, 35 feet long, from which two projectiles weighing 600 kilograms (about 1320 pounds) were fired with charges of 200 kilograms (about 440 pounds) of powder, the range being 18,000 meters (about 12 miles); but the gun burst at the third discharge. Bange was the first to make effective use of the screw principle in the mechanism of the breech block, and his gas check, consisting of a pad to prevent the escape of gases in more or less modified form, finds application in most guns with screw breech block. See GUNS, NAVAL, and ORDNANCE. For a description of his inventions, consult Hennébert, *L'Artillerie Krupp et l'artillerie de Bange* (1886).

**BANGKOK'** (city of wild fruit trees).

The capital of Siam and the chief commercial city of the country, situated on both banks of the Menam, about 25 miles by river from the bar at its mouth or about 14 miles direct (Map: Siam, D 4). It lies in a very low region and covers an area of over 15 square miles, principally on the left bank of the river. It is divided into many islands by arms of the Menam, and a large portion of the population live in floating houses; many houses are built on piles as a precaution against inundations, which are of common occurrence, owing to the low surface of the region. In recent years well-planned streets and roads have been built, crossing the water courses and canals and lined with many solidly built houses of brick. The portion of the city on the left bank of the river is surrounded by a high wall, about 6 miles in circumference. The part which adjoins the royal palace is beautifully laid out, with a number of parks and fine residences. The palace grounds are surrounded by a wall, inclosing the royal palace, the royal library, temples, theatre, harem, and the residences of the vast retinue of servants and attendants. The temples of Bangkok are numerous and gorgeous. A typical temple is built in several stories, rising terrace-like one above another, the whole forming a pyramidal-shaped building, the several roofs being of glazed tiles of the most brilliant colorings, while resplendent pillars are richly decorated with gold. The interior is invariably decorated profusely with precious stones, porcelain vases, and numerous statues of Buddha. In one of the temples there is a gigantic image of the saint in a reclining position, about 140 feet long, and richly inlaid with mother-of-pearl and gems. Among the temples, or *wats*, the most magnificent are Wat Phra Keo, Wat Benchamabophit (built in commemoration of the late King Chulalongkorn), Wat Phra Chetupon, Wat Suthat, and Wat Saket (in whose grounds rises the Golden Mount).

As the chief port of Siam, Bangkok has an extensive commerce, which is chiefly in the hands of Chinese and Europeans. The former have succeeded in monopolizing the retail trade as well as many of the industries of the city. The chief exports are rice and teak. In the year 1910–11 the rice export amounted to 17,588,349 piculs, valued at 91,060,879 ticals; teak, 7,624,092 ticals; total exports, 108,907,821 ticals. The native industries are almost extinct, and the porcelain ware, for which Siam was once famous, has been replaced by the Chinese article. In the year 1910–11 the tonnage entered at the port was 965,607, of which 415,393 German, 217,265 Norwegian, and 133,408 British. There is regular steam communication with Singapore, Saigon, and Hong Kong.

The transportation in the city was formerly and is still in part effected by boats, but Bangkok is now provided with a system of electric railways. A large part of the city is lighted with electricity. Bangkok is the seat of foreign legations as well as of many consular representatives, including one from the United States. There are four railway stations, terminals of the lines which connect the provinces with the capital. According to a census of 1910, the population was 628,675, of whom about 200,000 were Chinese; the remainder was made up largely of Siamese, Burmese, natives of French Indo-China, and Malays. Bangkok was an insignificant village until 1766, when Ayuthia, the residence of the King, was destroyed by the Burmese, and Bangkok became the capital.

**BAN'GLE** (Hind. *bangrī*, glass bracelet). A loose bracelet or armlet, generally of slender silver wire, and frequently strung with coins or ornamental pendants. Any number may be worn at one time. The bangle has a high antiquity, and many of the same form as those worn in modern times are represented on ancient works of art and have been found at Pompeii and in the tombs at Præneste.

**BANGOR,** bân'gôr (Gael. *Beannchar*, pointed hill). A seaport town, and favorite watering place in county Down, Ireland, on the south side of the entrance to Belfast Lough, 12 miles northeast of Belfast (Map: Ireland, F 2). It has manufactures of embroidered muslins and linen goods. Bangor Abbey, founded by St. Congall in 555, had 3000 inmates in the ninth century when it was destroyed by the Danes. The site is now occupied by the parish church. The Royal Ulster Yacht Club holds regattas at Bangor. Pop., 1901, 6046; 1911, 7776.

**BANGOR** (Celt. high choir). An episcopal city, municipal borough, and seaport town, in the northwest of Carnarvonshire, North Wales, Great Britain, on the southeast bank of Menai Strait, 9 miles northeast of Carnarvon, and 60 miles west of Chester (Map: Wales, B 3). The town stretches southwest through a fertile valley and is divided into upper and lower Bangor, the latter consisting chiefly of a narrow, crooked street, a mile long. The grandeur and beauty of the surrounding scenery have long made it a favorite resort. Bangor is the oldest bishopric in Wales, reputed to have been founded about 550 by St. Deiniol. The cathedral built by him was destroyed by the Saxons in 1071, rebuilt in 1102, and again destroyed by fire in 1402. The present edifice, built between 1496 and 1532, is a plain embattled cruciform structure, 214 by 60 feet, with a pinnacle tower 60 feet high. There are numerous educational institutions, including the University College of North Wales, Independent, Baptist, and Normal colleges. The town has undergone much modern improvement. It was incorporated in 1883; has municipal water works, gas and electric-lighting plants; maintains a free library, and has erected artisans' dwellings. Its chief trade is derived from the great Penrhyn slate quarries, 6 miles distant, which employ over 3500 men. The slates are taken to Port Penrhyn and exported to all parts of the world. Two miles west of the city the Menai suspension bridge, and Stephenson's famous Britannia tubular bridge, one mile to the south, span the Menai Strait. Pop., 1891, 10,000; 1901, 11,269; 1911, 11,236.

**BANGOR.** A city, port of entry, and the county-seat of Penobscot Co., Me., 135 miles by rail northeast of Portland, at the head of navigation on the Penobscot River, on the Maine Central and Bangor and Aroostook railroads, and on the Boston and Bangor division of the Eastern Steamship Line (Map: Maine, D 4). The Kenduskeag Stream, which here empties into the Penobscot, divides the city, the sections of which are united by several bridges; and a bridge 1300 feet long, over the Penobscot, connects Bangor with the opposite city of Brewer. The city is the seat of the Bangor Theological Seminary (Congregational), founded in 1816, the University of Maine Law School, the Bangor State Insane Hospital, and the Eastern Maine General Hospital. It also has a fine county

courthouse and a custom house, high school, and public library—the three last having been erected since the $4,000,000 conflagration in 1911. Bangor is an important commercial and manufacturing centre, with advantages of excellent water power, and a good harbor, having a deep-water frontage of three miles. Bangor is the jobbing and distributing centre for a wide area of Maine. The lumber interests are very extensive, and there are large foundries, machine shops, and factories, producing trunks, paper, stoves, canoes, and moccasins. In 1912 the value of the foreign commerce of the district of Bangor exceeded $4,000,000. The water works and street-lighting plants are owned by the municipality. The government, under a charter of 1834, is vested in a mayor, elected annually, and a bicameral city council, which controls the appointments of most of the administrative officers, though some are nominated by the mayor, subject to the consent of the board of aldermen. A movement for commission government was defeated in March, 1913. Pop., 1900, 21,850; 1910, 24,803; 1920, 25,978.

Bangor was visited by Champlain in 1604 and is one of the many places supposed to be the site of the mythical city, Norumbega (q.v.). The first permanent settlement was made in 1769 by Jacob Buswell, a "soldier and hunter, boat builder and cooper." The place was known as "Kenduskeag Plantation" until 1787, and as "Sunbury" from 1787 to 1791, when it was incorporated as a town under the name of Bangor. In 1834 it was chartered as a city. Consult: *History of Penobscot County* (Cleveland, 1882): various articles in the *Bangor Historical Magazine*, vol. i (Bangor, 1886); and an article, "Annals of Bangor," in *The Maine Historical Magazine*, vol. ix (Bangor, 1895).

**BANGOR.** A borough in Northampton Co., Pa., 45 miles (direct) southeast of Scranton, on the Lackawanna and Lehigh and New England railroads (Map: Pennsylvania, L 5). It is the centre of slate-quarrying interests and has silk mills and machine shops. Bangor was settled about 1760 and was first incorporated in 1875. The government is vested in a burgess, elected every three years, and a unicameral council. Pop., 1890, 2509; 1900, 4106; 1910, 5369.

**BANGO'RIAN CON'TROVERSY.** See HOADLY, BENJAMIN.

**BANGOR THE'OLOG'ICAL SEM'INARY.** A Congregational theological school. It was chartered by the Massachusetts Legislature in 1814, opened at Hampden, Me., in 1816, and removed to Bangor, Me., in 1819, where it graduated its first class in 1820. The course of study covers three years. The relation between the seminary and the Congregational churches of the State has always been close, and to these churches the seminary has furnished more than half of their pastors. In 1913 the library contained over 28,000 volumes, and the value of the seminary property, including buildings, was over $400,000.

**BANGOT,** bäng'ôt. See MANGUIAN.

**BANGS,** ISAAC SPARROW (1831–1903). An American soldier, born at Canaan, Me. He was mustered into the Federal service in 1862 as captain in the Twentieth Maine Volunteers, participated in the battles of Antietam and Fredericksburg, was appointed lieutenant-colonel of colored troops in 1863, and was placed in command of the Eighty-first United States colored infantry. Subsequently he became colonel of the Tenth United States colored heavy artillery, and commanded Forts Jackson, St. Philip, Pike, and Livingston, and the defenses of New Orleans. In 1865 he was brevetted brigadier-general of United States volunteers for gallant and meritorious service during the war.

**BANGS,** JOHN KENDRICK (1862–1922). A prolific American humorist and editor, born at Yonkers, N. Y. He graduated at Columbia College in 1883, where he edited the *Acta Columbiana* and first became known for his gift of humor. Later, he was associated with *Life*, *Harper's Magazine*, and *Literature*. In 1899–1902 he was editor of *Harper's Weekly*. In 1904–05 he was editor of *Puck*. He wrote *Coffee and Repartee* (1886) and *The Idiot* (1895), humorous productions which have been much enjoyed. His *House-Boat on the Styx* (1896) and *The Pursuit of the House-Boat* (1897) contain much amusing anachronism. His other works include *Mr. Bonaparte of Corsica* (1895); *The Enchanted Typewriter* (1899); *Uncle Sam, Trustee* (1902); *Proposal under Difficulties* (farce, 1905); *The Worsted Man* (play, 1905); *Lady Teazle*, a musical comedy version of *The School for Scandal* (1910); *The Idiot at Home* (1900); *The Inventions of the Idiot* (1907); *Echoes of Cheer* (1912), and *A Line o' Cheer for Each Day o' the Year* (1913), besides a large number of less known and less enduring books. Since 1910 Mr. Bangs has been very successful as a lecturer.

**BANGS,** LEMUEL BOLTON (1842–1914). An American physician, born in New York City. He graduated at the College of Physicians and Surgeons in 1872; was successively professor of genito-urinary diseases in the New York Post-Graduate Medical School and Hospital; genito-urinary surgeon in St. Mark's Hospital, New York; professor of genito-urinary surgery in the University and Bellevue Hospital Medical School. He was also consulting surgeon for various New York and Brooklyn hospitals and attending surgeon at the Bellevue Hospital. In 1895 he was President of the American Association of Genito-Urinary Surgeons. He has written an *American Text-Book of Genito-Urinary Diseases* (1898).

**BANGS,** NATHAN (1778–1862). An American clergyman. He was born in Connecticut. He began to preach as an itinerant in 1801, labored for some years in Canada, and removed to New York in 1810. He was chosen head of the Methodist Book Concern in 1820, and in 1828 became editor of the *Christian Advocate and Journal*. In 1829 he was elected Bishop of Canada, but declined the office. He became president of the Wesleyan University in 1841, but soon afterward returned to pastoral work in New York. Dr. Bangs was the author of numerous publications, the most important of which is the *History of the Methodist Episcopal Church* (4 vols., 1839–41). Consult a *Life* by Abel Stevens (New York, 1863).

**BANGUED,** bän-gäd'. The capital of the province of Abra, Luzon, in the Philippines (Map: Philippine Islands, C 2). The province is situated in the northern part of the island, has an area of 1484 square miles, and a population of 49,702. The surface is rugged, and there are numerous volcanic spurs. The valleys are fertile, with cotton, tobacco, rice, vegetables, etc., as the principal products. The capital is situated on the left bank of the Abra River, 236 miles north of Manila. It was first

settled in 1598. It has a telegraph station. Pop., 1903, 12,956.

**BANGWEOLO,** băng'wē-ō'lō. A shallow lake of central Africa, situated in Northern Rhodesia, between lat. 11°–13° S., the meridian of 30° E. cutting it centrally (Map: Africa, G 6). Its area is about 1158 square miles, and it is 3675 feet above the sea. It lies in the midst of a flat plain, its shores are low, parts of the lake are merely swampy in the dry season, and its surface is considerably expanded in the months of rain so that the shore line cannot be definitely defined. Most of the open water is bordered by tall water reeds. In the lake are a number of small inhabited islets, the largest of which is named Kisi. The chief tributary of the lake is the Chambezi from the east, while its outlet is the Luapula, issuing from its southern end, the large eastern source stream of the Congo. The lake was discovered in 1868 by Livingstone, who died at Chitambo's, on May 1, 1873, on the south shore of the lake. He believed that Bangweolo was one of the sources of the Nile. Consult Singer, "Der Bangweolo-See," in vol. xliv, *Petermanns Mitteilungen* (Gotha, 1898), and Weatherley, "Circumnavigation of Lake Bangweolo," in *Geographical Journal*, vol. xii (London, 1898).

**BANIALUKA.** See BANJALUKA.

**BANIAN,** bän'yan (Skt. *vanij*, merchant, trader). In India, a merchant or trader generally. It is more particularly applied to the great merchants in the west of India, especially in the seaport towns of Bombay, Surat, Cambay, etc., who carry on a very extensive trade by means of caravans with the interior of Asia, even to the borders of Russia and China. These merchants travel much, and the establishments and countinghouses of Indian banians are to be found in almost every commercial town of any note in Asia. In Bengal a corrupted form *bunya* is often applied to the native grain dealer. Some of the Marathi banians are agriculturists as well as traders, while in the Punjab the banians are said to belong in part to the degraded Chamar, or leather-working caste. Broadly speaking, the banians are a subdivision of the Vaisya caste, although in Bengal they are ranked with Sudras. In religion they are predominantly Vishnuites, with a large number of Jains in the west of India. From its original association with the merchants and the market place, the banyan tree of India received its name.

**BANIAN.** See BANYAN.

**BA'NIM,** JOHN (1798–1842). An Irish novelist. He was born at Kilkenny, April 3, 1798. In 1822 John and his older brother Michael (1796–1874) planned a series of short novels, which should do for Ireland what Scott was doing for Scotland. Three years later appeared *The O'Hara Tales*, followed in 1826 by a second collection; in 1828, by a third series, this last by Michael alone, as also another series in 1839, to which Miss H. L. Martin contributed "Canvassing." These sketches at once attracted notice, and they have maintained a place in literature. They contain many vivid portrayals of character, with the emphasis laid on the dark side of Irish life. If they have not the humor of Maria Edgeworth's *Castle Rackrent*, there is a certain compensation in the poetic feeling of John and in the vigor of Michael. See, for example, *Father Connell* (1840), by the latter. John afterward published several longer novels, *The Boyne Water* (1826), *The Anglo-Irish* (1828), and *The Denounced* (1829), besides several dramas, the best known of which is *Damon and Pythias*. In 1836, general sympathy having been attracted towards his privations, occasioned by disease that prevented all literary exertion, a pension of £150 per annum from the Civil List was awarded him, which was afterward increased by £40 for the education of his daughter. He died at Windgap Cottage, near Kilkenny, Aug. 13, 1842. Michael lived on, and wrote *The Ghost Hunter* (1833), *Father Connell* (1840), *Clough Fion* (1852), and *Town of the Cascades* (1864). He died at Bootersstown, near Dublin. Consult: Murray, *Life of John Banim* (London, 1857); H. S. Krans, *Irish Life in Irish Fiction* (New York, 1903); and see the section relating to Irish literature in Keating's *History of Ireland*, ed. by D. Comyn (1902–1908). See also IRISH LITERATURE.

**BAN'ISHMENT** (for derivation, see BAN). An extreme form of punishment for crime in primitive society, consisting in the exclusion of the criminal from the protection of the law and his abandonment to his enemies and to strangers. The ban or sentence of outlawry (q.v.) passed upon him not only absolved his family or tribe from all responsibility for him, but also involved the confiscation of his lands and goods. It was usually incurred for a refusal to submit to the jurisdiction of the tribunals or to the ordinary penalties imposed by them. In more advanced society banishment has sometimes been practiced as a punishment for crime—usually as a commutation for the death penalty—but in a mitigated form not involving outlawry, but enforced absence from the country. In this form, either with or without confiscation of goods, it was not an uncommon form of punishment in the Middle Ages, and in England during the Wars of the Roses; and it is to-day employed in some countries—as in Russia, Turkey, and the Central and South American republics—as a punishment for political offenses. In later English law the term has been employed to describe the penalty of transportation to the colonies, instituted by the act of Parliament, 39 Eliz. c. 4. Banishment has never been practiced as a means of punishment in the United States. It would probably fall within the constitutional provision forbidding the imposition of cruel and unusual forms of punishment. The practice of excluding or of deporting undesirable aliens, which obtains in America as well as in most other civilized countries, does not come under the description of banishment. See EXILE; PUNISHMENT; ALIEN; TRANSPORTATION, PENAL.

**BANISTER.** See BALUSTER.

**BANJALUKA,** bän'yä-lōō'kä, or **BANIALUKA.** A town of Bosnia, the capital of the district of the same name, situated on the navigable river Verbas and connected by railway with Agram (Map: Austria, E 4). It contains a number of mosques and several monasteries, and in its vicinity are situated some hot springs and coal and iron mines. It has cloth, powder, and grain mills, manufactures tobacco and beer, and carries on a trade in grain, animals, and tobacco. Pop., 1910, 14,793, including about 7000 Mohammedans, 2000 Catholics, and over 300 Jews. Banjaluka was, in 1878, the scene of an engagement between the Austro-Hungarians and the Bosniaks.

**BANJERMASIN,** bän'jĕr-mäs'ĭn. A city and district in Southeastern Borneo, held by the

Dutch since 1787 and incorporated in their possessions since 1860. The region is watered by the Banjar River, is inhabited chiefly by Dyaks, and produces gold, diamonds, coal, spices, gum, iron, wax, rattan, etc., in which articles there is considerable trade. Forest and jungle in the hilly interior, and rice fields in the flat valleys and along the seacoast are the features of the landscape. The town of Banjarmassin is built mostly on piles because of frequent inundation. Pop., 1895, 45,082; 1900, 52,685.

**BAN'JO** (a corruption, in negro-slave pronunciation, of *banjore, banjer;* cf. *bandore,* Portug. *bandurra,* Russ. *bandura,* all from Gk. *πανδοῦρα, pandoura,* a musical instrument with three strings). An instrument of the guitar kind, with or without frets, played with the fingers. It has a long neck, with a body resembling a tambourine or drumhead, formed of parchment stretched tightly upon a hoop. Banjos have from five to nine strings, usually of catgut, the lowest in pitch, however, being often covered with wire. The melody string, or thumb string, is placed outside the lowest bass string, and is played by the thumb of the right hand; the turning peg for it is inserted halfway up the neck. The thumb string from nut to bridge measures 16 inches, the other strings 24. The five-stringed banjo is tuned either a, e′, g♯′, b′, e², the last note being the thumb-string, or in G, a note lower. The pitch of the banjo is an octave lower than the notation. The banjo is a favorite instrument with the negro. Thomas Jefferson (*Notes on Virginia,* page 47) speaks of it as an instrument "proper to the blacks, which they brought hither from Africa, and which is the original of the guitar, the chords being precisely the four lower chords of the guitar." In Africa the instrument is known under the name *bania.*

**BANJOEMAS.** See BANYUMAS.

**BANJUWANGY,** bän'yōō-wäng'gēs (fragrant water). A seaport on the east coast of Java, the chief town of the district of that name (Map: East Indies, D 6). It is a military station, has extensive trade, and has an estimated population of 9000.

**BANK** (same as *banc,* bench, elevation). A portion of the oceanic basin within which the water is relatively shallow. A bank covers a larger area than a bar, the banks of Newfoundland and of the British Isles extending over several thousands of square miles; the depth of water also may be such as to offer no obstacles to navigation, although considerably less than the average for the oceanic trough. Banks occur off the shores of continents and islands where they have been built up by the deposition of sediment swept along by currents whose velocity (and hence transporting power) has been checked by contact with an opposing current or with a body of still water. In the case of the Newfoundland banks much of the sediment is transported by the icebergs brought down by the Arctic current from Greenland; that current meets the warmer waters of the North Atlantic drift south of Newfoundland and the bergs are then rapidly dissipated. Submarine banks have an important economic interest in that they afford the best fishing grounds for cod, mackerel, herring, and most of our edible sea fishes.

**BANKA.** See BANCA.

**BANKBAN,** bänk' bän' (properly **BENEDICT BOR**), called also BANCBANUS. A Hungarian military governor of the thirteenth century. There is a story, almost certainly legendary, to the effect that, his wife having been wronged by the Queen's brother, he stormed the royal castle and cut the Queen to pieces. On this are founded two dramas—one in Hungarian by Katona (1827), and the other Grillparzer's *Ein treuer Diener seines Herrn* (1830)—as well as a national opera by Friedrich Erkel.

**BANK, BANK'ING** (Fr. *banque,* It. *banca,* from Ger. *Bank,* a bench, table for changing money. Hence, *bankrupt;* It. *banca, rotta,* broken bench, as in Florence a bankrupt had his bench broken).

**Definition.** The term bank is today generally applied to any one of a great variety of institutions which exercise the functions of lending or advancing funds, guaranteeing credit, gathering and safeguarding savings, dealing in securities, collecting bills and drafts, and issuing notes. The term banking still remains associated in the popular mind with the making of loans of actual money, although that function long ago became nearly obsolete. It is still customary to speak of banks of "discount, deposit, and issue" although the distinction between these terms is no longer drawn as formerly. A prevalent classification today recognizes (1) commercial banks, engaged in dealing in short term credit and (2) investment banks dealing in long term credit and the instruments which represent it.

**Origin and Early History.** The origin of banking is in remote antiquity, but in its nature and scope great changes have been made during the past four centuries and particularly since the opening of the nineteenth century. The modern banker is a dealer in credit while in ancient times the so-called banker was a mere custodian of the funds of others and at times a buyer and seller of foreign moneys. The bill of exchange appears to have been recognized and used as a credit instrument by early bankers. Evidence of its use in Assyria several thousand years before Christ is available. In Athens and Rome several hundred years before the Christian Era there were merchants who dealt in foreign bills and received deposits. Instruments resembling the modern check were apparently in use. Livy mentions the argentarii as appearing as early as 350 B. C. By the time of Justinian the business of banking had become established and a body of jurisprudence relating to it had been evolved.

During the Middle Ages the insecurity of property and the risks attending commerce practically reduced banking once more to money changing, although there was still some traffic in bills of exchange. Modern banking is by some dated from the establishment of the early Venetian banks (1400–1600) in which the functions of deposit and note issue or the equivalent of them were exercised.

The Bank of Amsterdam and the Bank of Hamburg established during the seventeenth century performed duties approximately those of the modern bank. They did not issue bank notes and were not authorized to make loans but their credits based upon coin deposited became a popular medium of exchange in the settlement of all large transactions. These credits were known as "bank money" and are regarded by some as the first step in the evolution of the check and deposit system now in common use in Europe and the United States.

The Bank of Amsterdam was successfully managed from 1609, the date of its establishment, until the middle of the following century when secret advances to the Dutch East India Company resulted in the destruction of its credit. It was liquidated by a royal decree in 1819. The Bank of Hamburg was always conservatively managed and survived until 1873 when the adoption of an imperial coinage and bank currency by Germany rendered its services no longer necessary.

The banks of mediæval and early modern times thus had really but little similarity to the banking institutions of the later modern period. Centuries of experience were necessary to evolve current banking methods and to dispense with the conception of the bank as a money-lender organized on a large scale. From about the year 1700 onward, the beginnings of modern conceptions of banking may be traced. The first distinct institution to be developed was that of the credit note issue. Bank notes not covered by coin but representing or secured by the "notes of hand" or "bills of exchange" made by the customers of the bank, and protected by specie only to the extent of a percentage of their value, such protection being known as "reserve" or "cover" were gradually introduced into use and their employment became general during the second half of the eighteenth century. The balance sheets of most banks at about the close of that century show a great preponderance of outstanding notes among their liabilities, most loans being made through the bank's "extension" of its "credit," such credit having first taken the form of a "discount." At the same time but very much more slowly the idea of the "deposit" was being developed. Such deposits were at first what the name implies—a sum of cash left with the bank and transferable on its books at the order of the owner. By a natural process of evolution there developed the practice of crediting customers with such sums upon receiving from the customer a note of hand or bill which was admitted to discount. The basic operation of banking was thus discounting the obligations of its customers while the proceeds of the discount took the form either of a note or deposit subject to check. Wide use of the deposit was first developed in England and had attained a very substantial development by 1850. It was furthered by the growth of restrictive legislation which tended to hamper the action of banks in issuing their notes. Nevertheless by 1850 those operations were so general and well recognized not only in England, but throughout the world that the so-called classical economists designated the three basic functions of banking as being those of discount, deposit and issue. During the past fifty years of banking experience, a new conception of the banking function has become widespread, it being recognized that there is no essential difference between discount, deposit and issue but that the fundamental banking service is that of recognizing the title of a customer to credit and then substituting the bank's own credit for that of the individual up to a specified or agreed upon amount. This is what is called commercial banking. Of late years a distinction has been drawn between commercial and investment banking, the latter term being applied to the service rendered by institutions which collect savings or idle capital from individuals and turn them over to borrowers or producers who wish to use them in the conduct of industry. Such investment bankers find it expedient to issue or "float" securities which are offered for sale to investors and which represent a lien or claim upon the property of the borrowers. Investment banking is thus an operation of a totally different type from commercial banking, since its service consists of the gathering of funds which can be used in the creation of "capital goods" whose purpose it is to produce an income, while commercial banking is concerned with the turnover of consumable goods or goods approaching the consumable stage, and the advances made by the bank are liquidated through the absorption of the goods by consumers who purchase and pay for them out of their earnings or other incomes.

**Classes of Banks.** Banks are usually spoken of as divided into several classes, but the line of division or classification is not based upon any very uniform or recognized principle. In the United States there is a distinct legal grouping based upon the origin or source of their charter powers. This grouping recognizes so-called national banks which are vested with full banking powers of the commercial sort, including discount, deposit, or issue; State banks chartered by the several States or organized under general banking laws of the State and which are closely similar to the national banks except that they are in practice deprived of the power of note issue; savings banks which perform the function of receiving actual deposits of money or the equivalent thereof and investing such deposits in long term securities, largely mortgages on real estate; and trust companies which in most States exercise in addition to the fiduciary powers which their names imply (guardianship, trusteeship, executorship and others) many of the discount and deposit powers of commercial banks, but like the State banks are without the power of note issue. "Private banks" are usually partnerships existing under the general banking law of the several States. In foreign countries institutions of all these classes exist, the distinction between them being recognized substantially as in the United States, although in most countries the charters or certificates of incorporation are obtained from a single authority instead of as in this country, either from the central Federal or from the State government. Under recent legislation the sharp functional line which had once been drawn between these classes of banks is largely erased, although it still remains true that various institutions emphasize one side of their business and others devote attention chiefly to a different one. The classification of banks in principle is thus a matter of experience and depends upon the clientèle to which the institution appeals and the field which it has found most profitable.

**Deposit Function.** As already seen the function of receiving cash funds on deposit was one of the primitive functions of banking. Thus the Bank of Amsterdam, already described, simply received bullion and stored it issuing receipts for it which could be transferred from hand to hand and entitled the holder to get back the gold or silver originally deposited upon the payment of a small premium for withdrawal. Such a bank was merely a warehouse for bullion, but its service was valuable because it substituted the notes of the bank for the varied and uncertain metal circulation of the period, consisting of the coin of many nations often

worn or clipped. The bank received them at bullion value thus fixing their real value once for all. Early banks also by performing the service of safe keeping funds in times of hazard rendered a service which merited payment by the depositor. With commercial development the idea of safeguarding funds for depositors was displaced by the concept of receiving such funds and becoming liable to the depositor for them, they being reloaned in the meanwhile to borrowers. The final development was the granting of deposit credits to borrowers who were then classed as depositors. In modern banking no distinction either of accounting or in any other way is made between the depositor who leaves actual cash with the bank and the depositor who has given it his own obligation and received a credit in exchange.

**Checks and Credit Instruments.** For the depositor the bank acts as paymaster. The depositor pays his debts by orders upon the bank in the form of checks. This not only relieves the depositor of the necessity of keeping in his own possession sums of money larger than he has an immediate use for, whose safe-keeping would be a matter of anxiety and concern, but also furnishes him, through the endorsement of the check by the payee, a receipt for the money paid out. The banks also act as collectors for their depositors. Only a small part of the deposits in banks consists of actual cash; by far the larger proportion, often nine-tenths, being in checks and other credit instruments. When a check is deposited to the credit of a person, the bank charges itself with the duty of collecting it. If the bank is not able to collect at par, a fee may be asked for this service, but in general the cost is borne by the bank and not the depositor. If drawn upon the same bank, the collection consists merely of a transfer upon the books of the bank. If drawn upon another bank, collection may be made directly or through the clearing house. (See CLEARING HOUSE.) In either case there is likely to be a set-off, and the collection effected without the transfer of cash. But in addition to collecting checks, the bank collects other debts, such as coupons and negotiable paper.

**Savings Deposits and Interest.** In addition to these advantages which the depositor obtains from his bank account, he sometimes receives interest upon his deposits. Among the commercial banks of the United States the practice of paying interest upon deposits is now widespread. Persons who desire interest upon deposits must, as a rule, be content to surrender something of the absolute and immediate control over their funds, which is the characteristic of commercial banking. In such cases they patronize the savings banks or the loan and trust companies rather than the national bank. In these institutions various plans are adopted to restrain the depositor from making sudden calls for any considerable amount of his deposit. Sometimes it is a requirement of previous notice of the intention to withdraw, or again it may be a provision that a certain part of the deposit is to remain untouched, and that interest be paid upon this only.

**Note Issues.** The other form in which the modern bank issues its liabilities is that of notes. Note issues as already seen considerably antedated the modern form of credit deposit although deposit banking, in the sense of banking which occupied itself chiefly with actual cash funds, was the earlier form.

Where banking is not highly developed, the check is not a satisfactory means of making payment. In country districts sellers of produce often hesitate to accept checks, doubting the credit of the drawer. Under such conditions a bank, if not restrained by law from so doing, may employ its credit in the form of bank notes. Such notes are merely the promises of a bank, to pay a certain sum on demand; they are liabilities essentially of the same nature as deposits. Sound banking requires that a reserve shall be held for their redemption on demand, exactly as a reserve is held against deposits. There is no general rule as to the proportion of reserve to deposits in either case; but the proportion will generally be the same. It follows that there is no basis in fact for the popular view that banks which issue notes secure extraordinary profits thereby. The profit which a bank gains through making a loan of its credit in the form of bank notes is exactly the same as the profit it gains through lending its credit in the form of a deposit. It is of course a matter of great importance to the business man that he should be enabled to secure bank credit in a form which meets the needs of the community. In the city the most convenient form is the deposit upon which checks may be drawn; in rural districts the most convenient form is the bank note.

Where banks are freely permitted to issue notes, the process of redemption is analogous to the process by which checks are presented for cash. Every day, business men deposit with their banks notes received in payment for goods, etc. If such notes are deposited with the bank which issued them, the form of liability of the bank is simply changed, the value of the note being credited as a deposit. If deposited with other banks, they are assorted and presented promptly to the issuing bank, to be redeemed in cash. Accordingly no bank can issue an indefinite volume of notes, since this would endanger its solvency. There are the same restraints upon overissue of notes as upon overexpansion of deposits.

Although the bank note and the deposit are essentially liabilities of the same nature, the former is in most countries subjected to far more stringent regulation than the latter. The discrimination made by government in its treatment of the two forms of liabilities is explainable partly by the fact that whereas the depositor is presumably familiar with the financial standing of the bank in which he keeps his funds, no one can be expected to be a fair judge of the solvency of all banks whose notes he may receive in the course of business. In some measure the discrimination is due to the fact that the similarity in appearance between the bank note and lawful money creates a general belief that note issue is more properly a governmental function than any other use of the bank's credit, and should therefore be subjected to minute regulation, if not actually assumed by the government.

Where the regulation of note issue is very stringent, it often happens that banks are deterred from employing notes in making loans. If the check system is not commonly employed the result is a reduction in the lending power of the banks, since every loan implies the withdrawal of money. The principal sufferers, under these conditions, are the borrowers, who are

compelled to pay a higher rate of interest than would be necessary if the banks could employ their credit more fully.

**Reserves.** As already seen, both notes and deposits serve as a currency or circulating medium and they thus presuppose certainty on the part of recipients that they can be met promptly on demand. Success in thus meeting demand liabilities at sight when presented depends upon the holding of adequate cash funds, or upon being able to present other and offsetting claims upon those who ask for conversion. That part of the bank's funds which is held in cash or in credit available for use in liquidating demand obligations is called the bank's reserve.

When business is in its ordinary condition, a bank can, after some experience, approximate pretty nearly to the amount of the greatest demand for a return of deposits throughout the year, and provide accordingly. But sometimes the credit of a bank becomes doubted, either from causes peculiar to itself, or on occasions of a panic or general distrust, when all who own money wish to have it in their own possession. In these cases there is a *run* on the bank for repayment of its deposits, and the amount called for may be far beyond the maximum demanded in ordinary times. If the bank is unable to get a sufficient amount of cash to meet the demand, it is said to *suspend payment*, and, as a general rule, it must wind up its business, the confidence of the public that it will in future meet its liabilities on demand being now destroyed. There are two prime rules in safe banking: the one is, that the bank shall lend its funds only on undoubted and readily realizable securities, however low the profit; and the other that the bank shall retain a sufficient amount of its resources—and this is called the *reserve*—to meet the possible demands of the depositors even in case of a *run*, although there may be no reason to expect one; for when a run comes, it seldom casts its shadow before. But it is evident that the greater the reserve of a bank, the less the amount of funds which it can lend out and draw interest for; hence the temptation which banks lie under of imprudently lending out a too great proportion of their funds; and it is their yielding to this temptation that frequently precipitates the failures of banks.

In the practice of private banking the amount of the reserve is wholly in the discretion of the banker. Chartered or incorporated banks are frequently subject to legal provisions which determine not only a minimum reserve, but prescribe how it shall be held.

**Bank Loans.** It has been shown that the bank's liabilities are created only upon receipt from customers of their own obligations in equal amount, subject to an interest charge which constitutes the inducement to the bank to make the advance. The obligations of customers thus made directly in favor of the bank are usually termed "loans and discounts" the former designation ordinarily applying to advances bearing interest while the latter includes obligations of fixed amount due at a later date, from which the interest is deducted in advance in the form of "discount." Such loans and discounts are of several classes being grouped as time or demand paper, commercial or collateral advances or single and double name paper or bills of exchange. Bank loans are, in form, time loans for a definite period of days or months, and call loans, upon which instant payment may be demanded at will. Either form of loan may be made on the personal credit of the borrower, though this is not considered good banking, and can be safely done only in cases of persons of unquestionable standing. Loans are made, as a rule, upon mercantile paper and upon personal notes secured by the deposit of collateral. The time of the loan is definitely fixed by the face of the instrument, and the amount loaned is that stated in the note or draft, less the interest upon the same for the unexpired time. Loans upon collateral are either for a definite period of time or on call. As in the latter case the amount of interest cannot be fixed in advance, it is customary to loan a definite sum, and at the expiration of the loan collect also the interest at a rate agreed upon for the duration of the loan. The collateral or security consists of stocks or bonds greater in value than the amount of the loan and probable interest, which are for the time being deposited with the bank. In the event of failure to pay the loan the bank secures the satisfaction of its claim by the sale of the securities. In the case of discounts of mercantile paper the bank relies upon the good faith and general property of the several parties to the note or draft, without having a claim against any specific property. Ordinarily the borrower is content to receive the loan in the form of a credit account upon the books of a bank, upon which he may draw checks at will. Thus the discounted value of the mercantile paper or personal note is credited to the borrower as a deposit. In most modern banks of deposit the vast mass of the deposits are created in this way. In effect the borrower has merely exchanged his credit for that of the bank. He is ready to pay current interest to the bank because the latter's credit is generally acceptable and serves all the purposes of ready money.

**Public Regulation of Banking.** Public regulation of banking was originally regarded as unnecessary, banking institutions being allowed to conduct their business with but little restraint under charters that were often very broadly and loosely drawn. The harm done by unwise banking and the constant danger of loss to depositors resulting from bank failures and suspensions became more and more evident as experience showed the great service which could be rendered to individuals and corporations through the assistance of banks, as a larger and larger proportion of the population became customers, or holders of the obligations, of banks. Hence in many countries banking has been recognized as a semi-public service occupation and various methods of controlling it have been resorted to. Of these, the oldest is probably the issuance of bank charters only in an exceedingly restrictive and detailed form, practically constituting a code of law governing the operation of the institution. Growing directly out of this original plan, has been that of governmental control, or partial ownership, of a large central bank whose function it has been to keep the other banks of the community within bounds by requiring of them constant redemption of their obligations and by subjecting them to unofficial surveillance. In newer countries and particularly in the United States, where so-called "free banking" (i.e., the issuance of charters to practically any group of applicants who comply with relatively easy conditions) has taken root, the supervision of the govern-

ment has been exerted through regular and frequent bank examinations by functionaries appointed by the government, while the requirement of publicity of bank statements at frequent intervals has also tended to exert a useful influence upon the management of institutions.

Governmental regulation of one type may take the form of making the noteholder a preferred creditor in case of insolvency of the bank. This provision may be reinforced by giving the noteholder also a limited claim upon the general property of the stockholder. Thus, if the total assets of an insolvent bank are insufficient to redeem its notes, the stockholder may be called upon to make up the deficit, to the extent, say, of the par value of stock held by him. Further, note issue may be limited to a certain proportion of the capital of a bank. The various banks enjoying the privilege of note issue may be compelled to contribute to a fund for the redemption of notes of banks which have failed. Another method is to require the pledge of specified securities as a guaranty to the noteholder. This plan is best exemplified in the national banking system of the United States.

**Central Banking.** Apart from the mere question of public regulation central banking, either under governmental control or exclusively under private management, or directed by a combination of methods, has been developed as a means of overseeing, controlling, and directing banking, and of unifying banking practice and preventing undue expansion. Central banking is essentially banking for bankers; and central banks, in recent years, have tended to do less and less business for individual customers and more and more for other banks. In general the practice in central banking today recognizes the holding of reserves and the exclusive issue of notes as apropriate functions. The lending or discounting function, when performed by a central bank for its customer banks, is called rediscounting. In the practice of European central banks, the proceeds of rediscounts, when credited to the customer banks on the books of the reserve institution, constitute reserve credit, and notes may be used as the reserves of the customer banks. Rates charged for such rediscounting are ordinarily higher than the rates prevailing in the market, and are said to "lead" the market, the thought being that such higher interest charges prevent the applicant for rediscounts from obtaining them merely as a means of making current profits or earnings. The rate at reserve or central banks is thus used as a test or criterion of the volume of credit available in the community, and is supposed to show (when studied in conjunction with the reserve ratio or ratio of cash held to outstanding liabilities of the central bank) whether money conditions are "easy" or stringent in the community.

**Theory of Banking.** If every transaction in the community were effected by means of a bank check and if all traded equally and simultaneously with one another, operations would balance or clear, and there would be no occasion for redemption. Not only, however, are many transactions settled in money, but there is a difference in time of settlement due to the lapse of a certain period between the date when an obligation is incurred and the date when it can be settled out of the proceeds of goods sent to market meanwhile. Banks in extending credit provide a means by which individuals may use their titles to goods or property in the purchase of other goods or property. They thus provide a medium of exchange and, if their judgment as to the basis or security for the credit they thus extend is good, they simply enable commodities to exchange against one another, and so their action need not affect the current level of prices or relation between goods and money. It may happen, however, that borrowers at banks direct the purchasing power placed in their hands by means of bank deposits or bank notes in special channels, thus concentrating it upon certain classes of goods. It may also happen that banks grant credit upon the security of long term or future wealth or capital, thus in effect converting future resources into an immediate demand for existing consumption goods. Such action tends to bring about an advance of prices and is usually termed "inflation." It takes effect ordinarily in a general change of price index numbers. The opposite or converse movement is "deflation" and is effected through elimination from bank portfolios of the long term or doubtful paper existing there. This is usually accompanied by a decrease of prices. In inflation current obligations fail to cancel or clear one another so that reserve ratios decline as a rule and eventually in extreme cases banks may have to suspend specie payments.

**Banking in the United States.** The earliest use of the term "bank" in the American Colonies was to designate an issue of paper money, and it may be said that, in the history of banking in the United States, banks of issue play a more important part than elsewhere. The collapse of the continental paper currency in 1781 led to the chartering by Congress on the last day of the year of the Bank of North America. In addition to the usual business of a bank, this institution was designed to furnish through its notes a circulating medium for the country. The Bank of New York, and that of Massachusetts, at Boston, were chartered in the year 1784. But the erection of these institutions did not check the issue of paper money by the several States, which, however, ceased with the adoption of the Federal Constitution, which expressly forbade such issues.

Among the earliest acts of the new Congress was one chartering the first Bank of the United States, Feb. 25, 1791. The charter was for 20 years. The authorized capital was $10,000,000, of which the government took $2,000,000. The capital subscribed by the public was to be paid one-fourth in specie and three-fourths in government securities bearing 6 per cent interest. The government subscription was to be borrowed from the bank, payable in 10 annual instalments. The notes issued by the bank were receivable by the government for all debts due to it. The charter of this bank did not prevent the rise of a considerable number of banks in the States, which also issued notes. But by reason of its larger capital, and its several branches in different parts of the country, the Bank of the United States dominated the entire banking system and regulated the issues of the State banks. It could and did refuse to receive as deposits, or in payments, the notes of banks which were not sound, and by sending the notes received from one branch to another would insure the presentation of the notes of other banks for redemption. In the early part of the century the government sold its stock in the bank, and when, in 1811, the charter expired, the government had no direct

interest in its renewal. The renewal of the charter was opposed by the State banks, and the effort to secure it failed. The bank, thereupon, wound up its affairs. The absence of the restraining influence of the Bank of the United States soon made itself felt. State banks multiplied; from 90 in 1810, they grew to 150 in 1814, with note issues of $62,000,000. The war with England brought about a general suspension of specie payments, and a very disordered state of the bank-note circulation, the only currency of the country. The "old regulator" was seriously missed, and, on April 3, 1816, Congress chartered the second United States Bank at Philadelphia, with power to establish branches. Its capital was $35,000,000, of which the Federal government took $7,000,000; the bank, with its branches, was made the official depository of government money; its bills were receivable for all payments to the government and it was the agent for negotiating Federal and State loans. This compelled the State banks to resume specie payments, and business again moved forward steadily. State banks, however, grew in number rapidly. In 1816 there were 246, with $90,000,000 capital. In 1830, when the rechartering of the United States Bank was proposed, there were 330 State banks, with $145,000,000 capital. President Jackson, in his message, December, 1829, expressed his opposition to the United States Bank, and his expected veto of the bill to renew the charter came in July, 1832. The next step was to remove the deposits of public money from the bank. This took the form of an order to cease deposits in the United States Bank and to draw out the balance in payments. This could be done only by order of the Secretary of the Treasury, and as that officer refused to conform to the President's wishes, he was summarily removed, and a more tractable man was appointed in his place. The old bank, which had more than once saved the credit of the nation, was crippled and went down. In the wind-up it was found that its whole capital was lost, though it managed to pay its debts. It continued operations under a charter from the State of Pennsylvania until 1837, when it failed in the general crisis.

The refusal to continue the National Bank gave full scope to State institutions, and they grew with mushroom rapidity. In 1837 there were 788 of them, with a capital of $291,000,000. Their aggregate circulation was $159,000,000 and their deposits were $127,000,000. The loans and discounts amounted to $525,000,000. The inevitable crash was hastened by an enormous crop of cotton in 1836, a consequent decline in prices, and the depreciation of the credit of cotton dealers and their backers. The tumble began in 1837, and by the first of June there was an entire suspension of specie payments; values of all forms of property depreciated, business was deranged, and a period of wretchedness began which continued nearly five years. However, Congress passed a general bankruptcy law, the States assisted, by limitation and other laws, and by 1843–44 the country had nearly recovered. The banks had many trials; some resumed only to suspend again, and many went into liquidation. Congress passed the Independent Treasury Act, and thereafter the Federal government had no direct concern in banking until the Civil War broke out. The crisis of 1837 taught wisdom to the State banks, and a general retrenchment was the consequence. Between 1838 and 1842 the number of banks was reduced from 829 to 691; capital from $317,000,000 to $229,000,000; circulation from $116,000,000 to $59,000,000; and discounts from $486,000,000 to $254,000,000. Further security was demanded by the public, and among the new measures were the Suffolk Bank plan in Massachusetts, and the New York safety-fund system. The Suffolk Bank plan was merely an arrangement whereby that bank was made the channel through which all notes of New England banks that found their way to Boston, as most of them naturally did, were at once forwarded to the issuers for redemption. The result was that all solid bankers found it for their interest to deposit with the Suffolk a redemption fund, as that insured the acceptance of their notes.

The New York safety-fund system required each bank to deposit, with the banking department of the State, securities consisting of Federal or State stocks, or bonds and mortgages, which, in case of the failure of the bank, were sold, and the proceeds applied to the liquidation of its debts. In 1857 there was another crash, followed by a general suspension of specie payments; but the depression did not long continue.

One of the serious evils, avoided to a great extent by the issue of greenbacks and national bank currency, was counterfeited or altered bills. When almost every bank had its own plates for six or more denominations of notes, the country was flooded with counterfeits and alterations, and no business man ventured to accept a bank note not well known to him without previous comparison with counterfeit detectors, weekly volumes giving description of counterfeits and spurious notes.

The Civil War (1861–65) made large issues of credit necessary, and among the earliest financial proposals was one to enlist the interest of banks in the national credit by permitting them to organize under a national law and issue notes on the basis of bonds purchased by them and deposited with an officer of the government. It was, however, some time before these proposals took the form of law in February, 1863. The principle upon which this act was based was the issue of notes based upon government bonds deposited with the Treasury. The law proved defective, and was replaced by the Act of June 3, 1864. Under this act there was established a bureau in the Treasury Department, presided over by the Comptroller of the Currency, which should have supervision over the national banking system. No bank with less than $100,000 capital was to be organized in cities of above 6000 inhabitants; for places under 6000, the organization of banks with a capital of $50,000 was permitted. Fifty per cent of the capital of a bank was required to be paid in before the bank could commence business; the remainder of the capital was to be paid in in five equal monthly instalments. At least 30 per cent of the paid-in capital was to be invested in United States bonds, and transferred to the Treasurer, upon which he was authorized to issue to the banks notes equal to 90 per cent of the par value, but not to exceed the market value of bonds so deposited. The entire amount of currency to be issued was limited to $300,000,000, one-half to be apportioned among the States according to their respresentative population, and the other half with regard to the existing bank-

ing capital, resources, and business of the several States. The notes were to be redeemable in lawful money on demand, and were receivable in all payments to the United States, except for duties on imports. Country banks were required to maintain reserves equal to 15 per cent of their outstanding notes and deposits, of which three-fifths might be redeposited with other national banks in 17 specified large cities, denominated reserve cities. Reserve city banks were to maintain reserves equal to 25 per cent of their deposits and outstanding notes, but one-half of such reserves might be redeposited in national banks in New York City, which was made a central-reserve city. Later Chicago and St. Louis were placed on the same footing. Country banks were obliged to provide for redemption of their notes at par by some reserve city bank; reserve city banks were required to make similar provision for redemption in New York City. The system was slow in getting into operation, and the aid rendered the government by furnishing a market for its bonds was, after all, slight. In January, 1865, there were only 638 banks that had organized under the national law. To hasten the process a law of March 3, 1865, imposed a tax of 10 per cent on the notes of State banks, to go into effect July 1, 1866. Under the stimulus of this law the reorganization proceeded rapidly, and in October, 1866, the number of national banks had reached 1644.

**National Banks.** Of the national banking system, it may be said that the Civil War presented to Congress as its first duty the invention of some plan for restraining the heterogeneous banking system and providing a system of a homogeneous and absolutely safe character—one that would be truly national, operating alike in every part of the United States. The necessities of the government inspired the new order, but the old was rapidly failing to meet the wants of the people. The new, therefore, may be said to have grown out of the necessities of business as well as the straits of the nation. The new system preserved all the advantages of the old and added many new ones. It gave absolute protection to the holders of the national bank notes, as government bonds were deposited with the United States Treasurer in 10 per cent excess of their issue for the security of their redemption. It provided a high degree of security for the deposits, making the stockholder liable, in an equal amount of his stock interest, for their ultimate payment. It provided for a uniform bank note of equal value in every part of the country, so engraved and issued that security against counterfeits was far better attained than ever before. It provided for a system of redemption which made exchange merely nominal, and gave to national bank notes, wherever issued, a uniform value throughout the country. It provided a system of published reports over the sworn signatures of the executive officers of the banks, and a uniform system of examination under the direction of the Comptroller of the Currency.

The national banks were required to pay to the revenues of the general government as follows: (1) one-half of 1 per cent, semi-annually, on the circulation allowed by law; (2) one-quarter of 1 per cent semi-annually, on the average deposits for the half year; (3) one-quarter of 1 per cent semi-annually, on capital not in government bonds. The act permitted local taxation of individual holdings of national bank shares, but not at a higher rate than that applied to other moneyed capital.

Without any wide departure, until 1913, from the principles laid down in the original act, the laws governing national banks were, from time to time, considerably modified in details. Thus the restriction upon the aggregate amount of bank-note issues was removed in 1875. The charters of the banks were to lapse in 20 years, but in 1882 Congress authorized the recharter of the banks for terms of equal length. The currency law of March 14, 1900, made a number of important changes in the conditions of the issue of national bank notes. It permitted the issue of notes to the par value of the bonds deposited, instead of 90 per cent of the par value, subject only to the restriction that, in case the market value of the bonds should fall below the par value of the same, additional deposits of bonds or of lawful money might be required to maintain the security for the notes issued. The law provided for the conversion of several series of outstanding bonds into 2 per cent gold bonds, payable 30 years after date. To effect this change it offered to the banks a special inducement in reducing the tax upon the circulation, so far as issued upon the new bonds, from 1 per cent to one-half of 1 per cent. The act, moreover, favored the extension of the national banking system to small communities, inasmuch as it permitted the erection of banks with a capital of $25,000 in places where the population was less than 3000.

Apart from the change in circulation which was brought about by the Act of 1900, the development of the National Banking System during the two decades since that time has followed fairly conventional lines. One effect of the Act of 1900 was to increase very greatly the number of small banks with capitals of $25,000 or slightly more, and thus the number of new organizations has been maintained from year to year at a rapid rate of growth. The last report of the Comptroller of the Currency shows that the total number of national banks at the close of 1921 was about 8150. Of these a more than proportional number has naturally consisted of the banks of lower capitalization. The tendency of the note issue after the adoption of the Act of 1900 was naturally upward, reaching its peak about 1909, but the currency was always inelastic and unsatisfactory for reasons later set forth (p. 630). Nevertheless, no very great changes in the business or position of the banks took place until the adoption of the Federal Reserve Act on Dec. 23, 1913. In that Act, however, there were included several provisions of fundamental importance to the national banking institutions and through them to the State banking institutions. Probably the most important general requirements of the Act were that the banks become members of a Federal Reserve Bank, subscribe for its stock and deposit their reserve, at first in part, and later entirely with it. The Act, however, also granted to them authority under certain conditions to establish foreign branches and this permission was taken advantage of by a few large banks which have created net-works of branches abroad. The Act further granted to national banks the authority to accept bills thus enabling them to create outstanding time liabilities just as they had already possessed the authority to create demand liabilities. Advantage of this authority has been taken by some 375 banks,

that number of accepting institutions being known although there is nothing to prevent any national bank from accepting drafts up to a certain specified percentage of its capital without obtaining specific permission, so that the number may at any time be much greater than that just given. In addition to these important changes, the Federal Reserve Act also authorized national banks under certain conditions to lend 25 per cent of their capital and surplus upon real estate security thereby enabling them to assist directly the farming population of their communities through fairly long term advances. Added to these important changes was the fact that under the Federal Reserve Act, national banks were to be allowed to sell their government bonds at the rate of $25,000,000 per annum, to the newly organized Federal Reserve Banks at par, the latter banks taking over this currency and refunding it if they desired to do so, into 3 per cent bonds without the circulation privilege, thus theoretically providing for relieving the banks of the bonds and for retiring their outstanding bond currency within about 30 years. This provision was unfortunately only temporarily put into effect owing to the entry of the United States into the European War and the enormous issues of new bonds which followed thereafter. An important indirect influence upon the national banking system was also exerted by that provision of the Federal Reserve Act which constituted Federal Reserve Banks fiscal agencies of the government. This meant that eventually the Reserve Banks became the sole depositories of government funds while under the stress of war necessities they themselves later constituted their member banks, both national and State special depositories, but on conditions quite different from those which had previously existed when the national institutions were the sole and direct holders of government monies. Entitled to rank also with these great changes, was the provision of the Federal Reserve Act which granted to national banks the power to assume and exercise fiduciary functions upon the basis of substantial equality with those enjoyed by the local trust companies in the various parts of the country where such banks were situated. This privilege practically admitted the national banks into the trust company field and when the constitutionality of the action had been affirmed by the Supreme Court in 1916, the applications of national banks to the Federal Reserve Board for permission to exercise these fiduciary powers became numerous. Up to the close of 1921, 1387 banks had been granted by the Board the right to exercise such powers. Inasmuch as trust companies were also given competitive privileges which put them on a parity with national banks, through their admission to full rediscount opportunities by virtue of their permission to obtain membership in Federal Reserve Banks, the years since 1913 have helped to develop a parity and community of interest and method among State banks and trust companies and national banks which has on the whole tended to produce a more homogeneous banking system.

**Banking Reform.** The national banking system had been increasingly unsatisfactory ever since its adoption but the objections to such a system of banking grew more obvious at about the time of the panic of 1893. From that time forward the national banking currency became less and less satisfactory, and with each recurring stringency or "panic" less and less aid was rendered by the banks to business. The essential difficulties in the case were as follows:

(1) The national bank currency, being based upon United States bonds was obviously limited by the gross amount of such bonds in existence; while, since the price of such bonds was easily much above par, the banks being unable to obtain more notes than a sum equal to the par of the bonds, they found their profit greatly lessened as the value of the bonds rose.

(2) Owing to the practice of massing reserves in city banks (so-called "pyramiding" of reserves), our reserve position was very unstable. In times of stringency heavy drafts would be made upon the deposits carried by out of town banks with New York, Chicago and other metropolitan institutions, and as a result these banks would often be forced close to the danger line.

(3) The lack of any point of union, or community of policy, between national banks, save a loose general supervision at Washington, prevented the development of a discount market or of any uniformity in interest rates.

For these reasons a movement designed to attain so-called "banking reform" developed soon after 1893, and was continued with varying fortune during the two decades succeeding. An outstanding incident in it was the so-called "Indianapolis Currency Commission" an organization of bankers and business interests which was largely instrumental in securing the adoption of the gold standard act of 1900. This act as already observed in some measure alleviated the unfortunate note issue conditions then existing by providing for a consolidated issue of 2 per cent bonds possessing the circulation privilege at the same that it allowed the organization of national banks of $25,000 capital and so furnished banking facilities for the smaller towns. Such measures, however, although they provided the basis for a larger and somewhat more responsive note issue (rising to over $725,000,000) did not meet the essential difficulties in the case which were found in the pyramiding of reserves and the lack of coördination in the system. The banking reform movement had originally crystallized around the question of note issue, its advocates constantly insisting that an elastic note issue plan similar to that of the Canadian banks would solve the difficulty, but it came more and more, after the year 1900, to recognize that what was needed was a thorough reorganization of banking. The panic of 1907, however, broke upon the country before any relief measures had been taken. It tended to stimulate the demand for some legislative action and as a result Congress in 1908 enacted the so-called Aldrich-Vreeland Act providing for emergency circulation not to exceed $500,000,000 and taxed at the rate of 5 per cent (per annum) for the first month with 1 per cent for each additional month up to a maximum of ten. Such circulation might be issued either upon approved bonds deposited with the Treasury in Washington or upon approved securities or "two-name commercial paper" secured by the credit of so-called currency associations including not less than ten banks, the issues, however, not to exceed 30 per cent of the capital and surplus of the issuing bank. Only one or two such associations were at first organized and the act appeared to be a dead letter, remaining practically in that condition until the outbreak of the European war when Congress hastily amended

and liberalized it so that considerable issues of currency took place under its terms.

**Federal Reserve System.** Meantime, however, Congress had provided for a more thorough-going investigation of the whole question of banking and currency, and authorized (under the Aldrich-Vreeland Act) the appointment of a body known as the National Monetary Commission, composed of congressmen and senators, which should make a report of its findings. The commission thus appointed prepared a bill which was introduced into Congress early in 1912. The balance of power had, however, shifted to the Democratic Party and the bill of the National Monetary Commission was never given serious consideration. It would have provided for the formation of an institution analogous to a central bank with a total of fifteen branches established at various places throughout the country. This plan was similar in its character to measures which had previously been introduced by Charles N. Fowler, Chairman of the Banking and Currency Committee of the House of Representatives during the years 1904–08. It was, however, a more completely developed and perfected bill than any of its predecessors and embodied ideas which had been fairly generally accepted by the banking community.

The Democratic House of Representatives early in 1912 adopted a resolution providing for what was known as the "money trust inquiry" to be carried on by the Banking and Currency Committee. Under this authority the committee in question created two sub-committees, one of which was vested with the power to conduct inquiries into the so-called money trust, while the other was directed to prepare a banking revision measure. This second sub-committee, under the chairmanship of Honorable Carter Glass of Virginia, drafted a bill designed to reorganize the banking of the country, and after the election of Woodrow Wilson in November, 1912, submitted the measure to him and received a tentative approval for it. Mr. Glass was appointed Chairman of the Banking and Currency Committee in the new Congress which met immediately after the inauguration of President Wilson in 1913, and the bill which had previously been developed under the direction of the sub-committee in the preceding Congress was shortly introduced (June, 1913) and thereafter considered and adopted by the House of Representatives on September 17. This measure was considerably modified in the Senate but in conference committee it was amended back into nearly its original form, becoming a law on Dec. 23, 1913. As thus passed, the act provided for the establishment of a "Federal Reserve" System in which all national banks were obliged to take membership by subscribing 3 per cent of their capital and surplus to the stock of institutions to be organized in a number of districts throughout the country and known as Federal Reserve Banks. These banks were corporations chartered for twenty years under Federal authority, receiving deposits only from the government and from their member banks (though subsequently allowed to receive deposits from other banks under certain conditions), their chief duties being the issuing of notes and the holding of the reserves of their members. Their business consisted primarily of rediscounting paper for their members, although they were also authorized to buy paper (of the same kind that had been made rediscountable) in the open market, should they see fit. In issuing notes the Reserve Banks, as they were popularly called, were authorized to deposit eligible rediscounted paper with their chairman (the Federal Reserve Agent), acting as trustee for the government, who then issued an equal amount of notes to the Reserve Bank. The latter then placed them in circulation by paying them out or handing them to members who had requested such accommodation. By a later amendment gold might also be deposited with the chairman of the board in lieu of eligible paper. These notes were made obligations of the United States and receivable for all public dues. An organization committee, created under the act, eventually divided the country into districts and established twelve banks. Government control of the institutions was provided for by authorizing the Federal Reserve Board to name three out of nine directors for each of the reserve banks, the other six members being required to include three business men and three bankers, one business man and one banker being selected by banks voting individually, in each of three distinct groups (including the small, medium and larger banks of each district). It was further provided, in order to insure democratic government of the banks, that each bank should have but one vote regardless of capitalization. With reference to reserves, the act required that the 25 per cent reserve formerly required in central reserve cities be cut to 18 per cent of demand obligations; likewise also the 25 per cent formerly required in reserve cities was cut to 15 per cent, and the 15 per cent in other places was cut to 12 per cent. Of these reserves 7 per cent was to be placed by central reserve city banks with their reserve bank 6 per cent by reserve city banks and 5 per cent by all others. Time deposits were made subject to a 5 per cent rate throughout. Federal Reserve Banks were to be authorized to pay 6 per cent cumulative dividends after all expenses and allowances had been provided for to their stockholders, and their remaining earnings were then to be paid to the government.

An important feature of the act on its foreign banking side was found in the authorization granted the larger national institutions to establish branches abroad and in its grant of the power of accepting time bills (not over 90 days' maturity) to national institutions. In its ordinary rediscount operations the reserve banks were limited to ninety-day paper growing out of commercial, agricultural or industrial transactions, speculative paper being barred.

The act as thus adopted was subsequently modified by nine principal enactments. The important features in these amendments were (1) enlargement of the acceptance power to 100 per cent of capital and surplus; (2) permission to national banks to subscribe to the stock of foreign banking enterprises formed for the purpose of establishing branches abroad; (3) termination of the reserve requirements of the original law and substitution therefor of a provision requiring all reserves to be kept in Reserve Banks, such reserve to consist of 13 per cent of demand deposits for central reserve city banks, 10 per cent for reserve city banks, 7 per cent for all others, with time deposits at 3 per cent; (4) adoption of the so-called Edge Act authorizing the formation of corporations for the purpose of making long term investments abroad, national banks being permitted to sub-

scribe to their stocks; (5) enlargement of amount of loans permitted to be made on the strength of Liberty Bonds as collateral; (6) modification of voting arrangements governing the election of directors in Federal Reserve Banks; and a few others. Of these amendments the only one which fundamentally altered the structure and significance of the act was that transferring the entire reserves to the central institutions.

As provided for by the Act of 1913 the Federal Reserve System went into operation (preliminary details having been arranged by an organization committee) technically on the 10th of August, 1914, the banks themselves being actually opened for business on November 2, while reserves were paid over on November 14 of the same year. Prior to the actual opening of the banks Congress as already noted had revised and extended the provisions of the Aldrich-Vreeland law in order to relieve the severe financial stringency brought on by the opening of the European war and resulting from the sudden and unexpected calls made by English and other foreign creditors who demanded immediate payment in gold of amounts which in ordinary circumstances would have been carried during the summer and autumn season and paid off through exports of commodities. Under this revision of the Aldrich-Vreeland law emergency currency amounting to nearly $450,000,000 was issued and the use of it resulted in a considerably inflated condition in some parts of the country. The Federal Reserve System when fully established had the effect of immediately releasing a great deal of lending power previously "tied up" by reason of the fact that resources under the old law were so much higher than under the new. There was little general demand for the resources of the Federal Reserve System, therefore, save in those parts of the country where banks, in order to retire their emergency currency issued under the Aldrich-Vreeland law, applied for rediscount facilities in order to transfer their liability to the Federal Reserve Banks. The first work of the new System was thus to assist in the retirement of the emergency currency. In spite of the great increase of business throughout the United States during the first two years of the European war, there was no very serious need of Federal Reserve assistance, and during 1915 and 1916 many of the Reserve Banks were barely able to make expenses or to cover a part of their dividends in addition. The two years were occupied largely in developing methods of discounting and establishing new plans of note issue. A constructive piece of work carried through during these years was the establishment of the Gold Settlement Fund at Washington whereby the Federal Reserve Banks were enabled to clear on the central set of books conducted by the Board the bulk of their obligations against one another, thereby avoiding the shipment of specie. This clearance, at first carried on only once each week, was later made a daily clearance, and eventually came to supersede in large part the work of the local clearing houses.

With the entry of the United States into the European war early in 1917, a new epoch in the history of the Federal Reserve System and of the banking system of the United States in general opened. The fundamental problem at the opening of the war was that of finding means to supply the Treasury with necessary funds. This object was temporarily accomplished by direct borrowing from the Federal Reserve Banks on short term treasury certificates. The system of Liberty Loans was then developed and the Reserve Banks were made the active agents of the Treasury in placing them. The Federal Reserve Act had originally provided for making the banks the fiscal agents of the government and this was now interpreted to include not only sub-treasury functions but also all those relating to the sale and distribution of bonds. The importance of the sub-treasuries accordingly was reduced and they were eventually closed in 1920, but during the latter part of the war and the period just after it their activity was purely nominal. With the issuance of the First Liberty Loan in July, 1917, the activity of the Federal Reserve Banks was largely transferred to a war basis including the management of public finance and continued so throughout the remainder of the struggle.

**War Banking and Finance.** From the date of the entry of the United States into the European war the function of the Federal Reserve System became almost exclusively that of financing the process of borrowing from the people. During the years 1917, 1918, and 1919 the government increased the national debt from a little over $1,000,000,000 to a little over $25,000,000,000. These great loans were for the most part placed first through the banks and then with the rank and file of the investing public. It would probably have been impossible to dispose of the enormous quantities of bonds which the government was obliged to sell in order to provide itself with funds without some kind of special banking aid. Such aid was particularly necessary in view of the fact that it had been determined by the Treasury authorities to dispose of the bonds at a rate of interest quite materially below the prevailing rate in the market. The first issue of Liberty Bonds was sold at 3½ per cent and as subsequent issues were put out the rate was gradually raised until it reached 4¾ per cent on the fifth victory loan (1919); although it should be remembered that the first loan bearing 3½ per cent had been wholly exempt from taxation of all classes, while subsequent loans were only partially so exempt. That the public might be induced to purchase up to the full extent of its saving power, paying for the bonds it thus bought on the installment plan, Federal Reserve Banks were instructed by the government through the Federal Reserve Board to fix a rate for the rediscount of paper equal to the coupon rate on the Liberty Bonds. Commercial banks generally were induced to discount directly for their customers at the same figure. Thus a buyer of bonds who was unable to pay for them in full, borrowed from his bank the additional amount he needed, the bank carrying it without cost to him since the coupons provided for the borrower's own interest charge. The bank then rediscounted such paper at the same (coupon) rate with the Federal Reserve Bank of its district. This policy was very successful in "stabilizing" the rate of interest, but it also tended to transfer the principal burden for the time being at least to the banks. The system was perfected through the steady issue of Treasury certificates sometimes as often as twice a month, these certificates running for ninety days as a rule and being funded at the end of that period

into the successive issues of Liberty Bonds which were then subscribed for and carried as indicated. The burden resting upon Federal Reserve Banks thus became heavier and heavier as the war advanced and as successive issues were sold. Hence the reduction of the reserve ratio (ratio of gold to demand liabilities) of the system, which fell from about 90 per cent before the war to about 52 per cent at the end of 1918, shortly after the Armistice. The fifth Victory Loan which was floated early in 1919 was sold upon the same general principles that had been pursued in the earlier financing and resulted in increasing the burden resting upon the reserve system still further. The successful floating of this loan was followed by a speculative development of business and especially of foreign trade, which continued during the year 1919, and although checked early in 1920 did not reach its peak until about the close of the latter year.

Prices during the war had tended to rise rapidly as a result of a variety of causes. Of these the principal was the tremendous demand exerted by all governments for commodities, coupled with the natural shortage in production which resulted from the withdrawal of a large part of the productive labor of all of the Western nations for the purposes of war. A contributing cause of the rise in prices, however, was found in the suspension of specie payments and excessive issue of currency which produced the condition of "inflation" reflected in unduly high prices for commodities and services of all classes. This price and wage advance continued steadily up to a peak in May, 1920, at which time the index number of prices was approximately 270 measured from a base in 1913 taken as 100. The check to expansion and wholesale-price advance administered early in 1920 has been variously explained and has been popularly attributed in the United States to the fact that Federal Reserve Banks toward the end of 1919 resolved upon the so-called deflation policy. This deflation policy took form as an advance of interest rates above the low levels that had been established during the Liberty Bond period. It was aided by a more strict interpretation of the eligibility of paper for rediscount, coupled with an effort to induce borrowers who had obtained advances on Liberty Bonds as collateral to settle these loans and thus to take them out of the banks. The inadequacy of this explanation is indicated by the fact that the recession in business and prices which set in early in 1920 did not originate in the United States but was first indicated by the collapse of the silk market in Japan, while in most foreign countries no very definite deflation effort was undertaken until after the business recession had begun. Federal Reserve discounts as already stated did not reach their peak until the end of 1920 some eight months after the business decline had started. At that time total assets of the Reserve Banks were approximately $5.000,000,000 while bills discounted were about $2,700.000.000 and currency outstanding was about $3,336.000,000. As the decline of business became more pronounced during 1921 the price level gradually sank to approximately 140 or a little more than half its level at the peak while discounts at Federal Reserve Banks had been reduced by the end of 1921 to less than $1,150,000,000. Notes at the same time receded to about $2,400,000,000, thus contracting over one-fourth of their maximum amount. The inability of foreign countries to settle their enormous purchases in the United States had led during the war to very heavy advances made by the government to foreign governments and expended almost entirely in the United States. These advances were to be continued until about the middle of 1919 some eight months after the Armistice and amounted to about $9,500,000,000. When they came to a close there ensued a period of trade expansion already noted during which considerable advances were made by American banks and business houses for the purpose of carrying foreign buyers as long as possible. As it became more and more evident that foreigners would not be able to liquidate these debts in full banks and exporters began to withdraw these credits and the large movement of gold into the United States which had been very marked during 1916 and 1917 was resumed. From the opening of the war in 1914 to the close of 1921 the total net importations of gold into the United States amounted to about $1,542,000,000 and the total gold holdings of the Federal Reserve Banks rose to about $2,900,000,000. At the same time the ratio of reserve to liability advanced to approximately 70 per cent. One of the noteworthy services of the Reserve Banks during this whole period of unusual trial and strain was seen in the great reduction of bank failures, the total of failures at no time being large and in some years being practically negligible.

**National System of Clearance.** One of the most important features of the Federal Reserve Act was seen in its provision for a satisfactory clearance and collection system. The original act had authorized each Federal Reserve Bank to "exercise the functions of a clearing house" for its members. In carrying out this authorization the Board first established what has come to be known as a gold settlement fund. This was intended as a means of settling obligations between reserve banks. Each reserve bank contributed a certain amount of gold to the fund and then telegraphed weekly to the Board its claims against others in a single figure. The clearance was effected on a set of books kept for the purpose and each bank was then notified of the changes resulting therefrom in its participating share of the gold settlement fund. So successful was the system that it eventually came to include a total of over $500,000,000, while a second fund was established for the clearing of obligations between the Federal Reserve agents departments of the several banks. Altogether the gold settlement fund which had come into effective working about eight months before the United States entered the war proved a most effective agency in gathering the subscriptions to the Liberty Loans in different parts of the country without disturbance to the banking and commercial mechanism. The second phase of the clearance and collection system was found in the plan instituted in the several districts for the purpose of clearing and collecting local items on behalf of the member banks themselves. The Act had authorized the reserve banks to accept items from members on deposit at par without charge for exchange or collection, the intent being that such items should be automatically and instantaneously credited to the depositing banks, being simultaneously charged off against the reserve accounts of the banks upon which

they were drawn. Resistance on the part of the members who feared that as a result they would lose their profitable collection business resulted in an unsuccessful attempt to apply the system upon a voluntary basis. This proved totally ineffectual, and in July, 1916, it was resolved to introduce a system of credit and collection in which the deposits made by members were carried to their account only after the lapse of sufficient time to permit the actual transmission of the checks to the member banks on which they were drawn thereby giving such banks an opportunity to examine and pass upon the signatures. This system was gradually extended not only to members, but also to non-members and eventually came to include some 29,000 banks out of a total of 30,000 in the country, all these banks undertaking to remit at par. In the year 1920–21 resistance on the part of Southern banks which found themselves deprived of collection charges led to the enactment of hostile legislation in six Southern States while the validity of collection methods employed by Reserve Banks was brought to a trial in the courts. A verdict in the Federal District Court for Georgia rendered in March, 1922, has upheld the system employed by the Federal Reserve Bank. The effect of the system up to date has been greatly to reduce charges to the business public (although not to wipe them out altogether owing to the effort of organized clearing houses to maintain at least a moderate charge for collection service), and to eliminate enormous volumes of unpaid checks which had previously been routed from bank to bank for the purpose of building up so-called reserve deposits thereby swelling the amount of such deposits technically carried on the books of the various institutions. The elimination of this so-called "float" has greatly tended to increase the liquidity and solvency of the banking system and to diminish the danger of unexpected runs upon individual institutions.

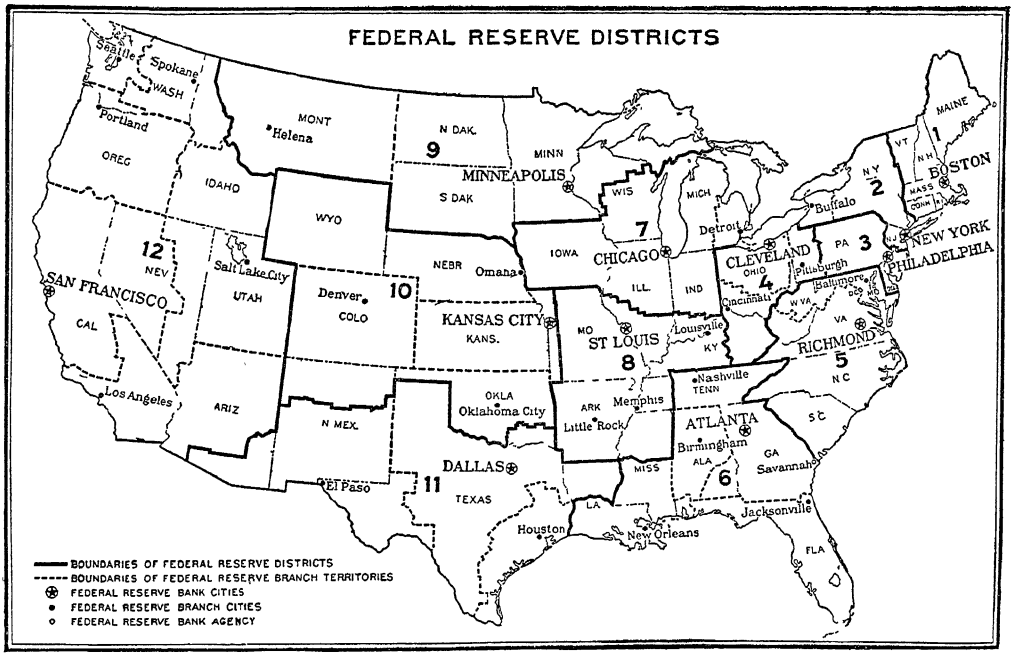
**Standardization of Paper.** Another important service rendered by the Reserve system has been the standardizing and definition of commercial paper. The eligibility rules laid down by the Federal Reserve Board in accordance with the powers bestowed by the Federal Reserve Act have been generally accepted throughout the country as indicating the highest type of commercial paper available and the result has been to eliminate much doubtful long term or non-liquid paper from the banks entirely or at all events to confine it locally. In the process of thus defining and developing commercial paper the Board has sought to secure the introduction of acceptance of two-name paper well known abroad but much less frequently employed in the United States. Acceptances under the Administration of the Reserve Board have taken two forms—trade and bankers acceptances. The trade acceptance although urged upon the attention of the public by the Board has been on the whole not well adapted to American commercial practice owing to the widespread prevalence of the so-called cash discount system. It has never attained very large development. The bankers acceptance on the other hand has been widely employed in the financing of foreign trade and at one time probably amounted in volume to a little less than $700,000,000 of acceptances made by member banks. During the business depression it fell off in amount a little more than $400,000,000 (end of 1921), and has been in some measure impaired by the amendment enacted by Congress providing for so-called dollar acceptances drawn on countries in which it was not possible to furnish documentary evidence of the basis for transactions. Owing to this and other abuses the bankers' acceptance was somewhat lessened in popularity as a strictly commercial instrument, although it has at all times retained an important position as a finance bill or clean bill.

**Growth of Reserve System.** The Reserve System has established in all 22 branches with the purpose of increasing the efficiency of its collection mechanism and of promoting the convenience of members in the discounting of paper and the drawing of bills. These branches have been located at strategic points throughout the financial districts and their existence has gone far toward eliminating bad effects of any errors that may have been committed in the original arrangement of districts. Although at the outset it was believed that considerable rearrangement of such districts would be necessary these turned out to be only minor changes and the geographic divisions of the system continued but slightly changed up to the present time. As thus constituted today the system with its branches may be represented in the accompanying map.

**Banking in England.** In the banking system of England the central figure is the great Bank of England. This bank, the most important in the world, was projected by William Paterson (q.v.), and was incorporated July 27, 1694. It was constituted as a joint-stock association, with a capital of £1,200,000. In return for the loan of its entire capital to the government, it received the right to issue notes and a monopoly of corporate banking in England. It was not until early in the nineteenth century that this monopoly was broken down. At its very outset the Bank of England was a servant of the government; and in a lesser or greater degree it has enjoyed this character through all the stages of its subsequent history. At first the charter of the bank was for 11 years only; but in consequence of the great services of the institution to the government, its charter has been at various times renewed. The last renewal was in 1844, and the charter of that year still subsists, its terms being subject to modification or revocation by the government at pleasure. By the Act or Charter of 1844 the bank was divided into two departments—the *issue* and the *banking*. What led to the division was this: it was supposed that, when a foreign drain of gold should set in, it would, if the currency or circulation in the country had been purely metallic, have produced a contraction of the circulation, and a consequent fall of prices, and, as an ultimate result, the cessation of the drain.

In the *issue* department of the Bank of England the sole business is to give out notes to the public. Before the separation of the departments the government was indebted to the bank £11,015,100. This sum was declared to be now a debt due to the issue department, and for the issues of notes to that amount no gold need be held by it. The amount of this so-called "fiduciary issue" has since increased to £18,450,000.

Viewed in its banking department, the bank differs from other banks in having the manage-




RESOURCES.*

| | |
|---|---|
| Gold and gold certificates | $316,937,000 |
| Gold settlement fund—F. R. Board | 532,351,000 |
| Total gold held by bank | 849,288,000 |
| Gold with Federal Reserve agents | 2,123,373,000 |
| Gold redemption fund | 48,207,000 |
| Total gold reserves | 3,020,868,000 |
| Legal tender notes, silver, etc. | 127,498,000 |
| Total reserves | 3,148,366,000 |
| Bills discounted: | |
| Secured by U. S. Government obligations | 189,909,000 |
| For other Federal Reserve banks | |
| All other—For members | 279,192,000 |
| For other Federal Reserve banks | |
| Bills bought in open market | 154,060,000 |
| Total bills on hand | 623,161,000 |
| U. S. bonds and notes | 224,638,000 |
| U. S. certificates of indebtedness: | |
| One-year certificates (Pittman Act) | 74,000,000 |
| All other | 257,969,000 |
| Total earning assets | 1,179,768,000 |
| Bank premises | 41,568,000 |
| Five per cent redemption fund against F. R. Bank notes | 7,587,000 |
| Uncollected items | 511,571,000 |
| All other resources | 15,988,000 |
| Total resources | $4,904,848,000 |

LIABILITIES.*

| | |
|---|---|
| Capital paid in | $105,078,000 |
| Surplus | 215,398,000 |
| Reserved for Government franchise tax | 2,281,000 |
| Deposits: | |
| Government | 43,780,000 |
| Member banks—reserve account | 1,865,199,000 |
| All other | 30,297,000 |
| Total | 1,989,276,000 |
| F. R. notes in actual circulation | 2,124,422,000 |
| F. R. Bank notes in circulation—net liability | 67,259,000 |
| Deferred availability items | 430,314,000 |
| All other liabilities | 20,820,000 |
| Total liabilities | $4,904,848,000 |
| Ratio of total reserves to deposit and F. R. note liabilities combined | 77.5% |
| Contingent liability on bills purchased for foreign correspondents | |

* June 28, 1922. Twelve Reserve Banks combined.

STATISTICS OF MONEY AND CREDIT IN THE U. S.—1914–1921.
(000 omitted)

| | General stock of money in United States. | All banks, national, State, and trust companies. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Loans and discounts. | | | | Deposits. | | | |
| | | Member banks. | | Nonmember banks | Total. | Member banks. | | Nonmember banks. | Total. |
| | | National banks. | State banks and trust companies. | State banks and trust companies. | All banks. | National banks. | State banks and trust companies. | State banks and trust companies. | All banks. |
| June, 1914[1] | $3,779,052 | $6,430,069 | ..... | [3] $5,813,290 | $12,243,359 | $6,359,188 | ..... | [3] $7,166,600 | $13,525,788 |
| June, 1915[1] | 3,923,077 | 6,659,971 | ..... | [3] 5,956,692 | 12,616,663 | 6,611,282 | ..... | [3] 7,482,368 | 14,093,650 |
| June, 1916[1] | 4,374,966 | 7,679,167 | ..... | 7,113,349 | 14,792,516 | 8,143,048 | ..... | [3] 9,494,749 | 17,637,797 |
| June, 1917[1] | 5,425,417 | 8,957,678 | ..... | [3] 8,423,246 | 17,380,924 | 9,743,755 | ..... | [3] 11,188,113 | 20,931,868 |
| June, 1918[1] | 6,615,008 | 10,135,842 | $3,153,726 | [3] 6,143,295 | 19,432,863 | 11,219,526 | $4,456,546 | 7,642,420 | 23,318,492 |
| June, 1919[1] | 7,592,079 | 11,010,206 | 4,494,656 | 6,445,167 | 21,950,029 | 12,457,925 | 6,211,276 | 8,497,149 | 27,166,350 |
| June, 1920[1] | 7,804,528 | 13,611,416 | 6,027,030 | 7,729,785 | 27,368,231 | 14,311,401 | 7,582,238 | 9,390,850 | 31,284,489 |
| June, 1921[1] | 8,073,737 | 12,004,515 | ..... | [4] 12,757,414 | 24,761,929 | 15,142,331 | 7,385,507 | [4] 16,135,093 | 31,277,424 |

[1] Figures as of last week in month.
[3] Includes both member and nonmember State banks and trust companies.
[4] Includes both member and nonmember State banks and trust companies

ment of the public debt and paying the dividends on it; in holding the deposits belonging to the government and making advances to it when necessary; in aiding in the collection of the public revenue and in being the bank of other banks.

During the European war great changes necessarily occurred in the currency and banking situation in Great Britain. The amount of currency in circulation rose to probably three times its prewar amount, while prices advanced more than 100 per cent. Shortly after the outbreak of the war the convertibility of Bank of England notes was suspended and provision was made for an issue of treasury which were put out by the government, these being of a lower denomination. At the date of the Armistice the treasury notes in circulation were about 320,000,000 pounds sterling. Scotch and Irish notes were made legal tender but this privilege was withdrawn after the close of hostilities. It is difficult to say how long the changes in British and Scotch banking will continue. The Currency and Bank Notes Act of 1914, although passed to meet an emergency, was not in form a temporary act, and while the restoration of actual convertibility of notes and credit into gold was promised by the Chancellor of the Exchequer early in 1922 it has not thus far been feasible to make it effective. The value of the pound sterling, however, has steadily risen toward par from the low point reached soon after the close of the war.

**Other Banks in the United Kingdom.** While the Bank of England long held a monopoly of banking in London, it could not prevent the rise of banks throughout the provinces. In the first instance these banks were merely private partnerships, and the number of partners could not exceed six. These country banks issued notes, and were without any government supervision or control. After the panic of 1825 a law was passed permitting the country banks outside of a radius of 65 miles from London to organize as joint-stock companies, with their right to issue notes unimpaired. The Bank of England strenuously but ineffectively opposed the extension of the joint-stock principle, which had been conceded in the provinces, to the London banks. In 1833 an Act of Parliament authorized the establishment of such banks in London, though it refused to give them the note-issuing privilege. When the Bank of England was rechartered in 1844, all joint-stock banks and private banks were restrained from issuing further notes, though they were authorized to maintain the circulation then outstanding, calculated on the average of the twelve weeks' prior to April 27, 1844. Under the terms of the act, the Bank of England has since absorbed the whole of the English banks notes issues, the last of which lapsed in 1921.

The earliest banking institution in North Britain was the Bank of Scotland, instituted by a charter of incorporation from the Scottish Parliament in 1695. The original capital was £1,200,000 Scots, or £100,000 sterling. In 1774 the amount of stock was extended to £200,000 sterling; now it is £2,000,000 sterling. In 1727 a new and similar establishment was constituted under the title of the Royal Bank of Scotland, whose advanced capital is now £2,000,000. In 1746 another association was formed, and incorporated by royal charter, with the title of the British Linen Company. From £100,000 its capital has increased to £1,250,000. Besides those three banks, there are in Scotland five other joint-stock banks with total deposits of £291,000,000, but no private banks.

In consequence of allowing interest on deposits, the banks in Scotland may be said to hold the whole currency of the country, minus only the money passing from hand to hand. This widespread system of depositing is greatly aided by the establishment of branches from the parent banks, and these branches are found in every small town in the kingdom. The entire number of branch banks in Scotland is about 1300. At these branch banks the agent (who is usually a responsible person in business) discounts bills within certain limits, issues letters of credit, and pays out notes, and also gives cash on demand for them; though, strictly, the notes of a bank are payable on demand at the head office only. By a strict system of supervision Scottish branch banks are usually well conducted and are of great service in every department of trade.

In Ireland there are nine joint-stock banks, having 947 branches and sub-branches. Aggregate circulation in 1921 was £19,000,000. The circulation of the Bank of Ireland was £9,000,000. This bank was established in 1783, with privileges resembling those of the Bank of England. Its capital is £2,769,230, and its reserve £1,140,000. The capitals of the other banks vary, the total being £27,000,000, while deposits are £213,000,000. Six are banks of issue. Interest is allowed on money deposited for a stated period, but not on money at call, or as a rule on current accounts.

**Continental Banks.** On the continent of Europe there are both private and state banks. The Bank of France stands second in repute only to the Bank of England. It was founded in 1800, and in 1806 was placed upon an enduring basis. Its original capital was 45,000,000 francs, which was increased in 1806 to 90,000,000 francs, and later reduced to 67,900,000 francs, with a reserve of 12,980,750 francs. It has the sole right to issue bank notes in France and enjoys a high degree of public confidence, which it is so anxious to retain that in 1888, when dangerous counterfeits of its 1000-franc notes were put into circulation, it preferred to redeem them rather than, by refusing payment, to impair the general readiness to receive its own genuine paper. The Bank of France has often rendered important services to the French government in furnishing large and promptly given loans. It has some 600 branches or *succursales* in the chief cities of France. The Banque Nationale of Belgium is conducted upon the model of the Bank of France. It issues notes for 20, 50, 100, 500, and 1000 francs. In Germany the Imperial Bank (Reichsbank) was established by an act passed in 1875, with the right to issue notes not covered by bullion in the vaults, to the amount of 250,000,000 marks ($62,500,000); while a number of subordinate banks are permitted to issue uncovered notes to the amount of 135,000,000 marks ($33,750,000). Notes are issued for 5, 50, 100, 500, and 1000 marks. The state itself (by an act passed in 1874) may issue 120,000,000 marks in small notes for the general convenience of the public. For a more detailed treatment of the banking systems of foreign countries, see articles on those countries.

Conditions on the Continent during the Euro-

pean war ran closely similar to those in Great Britain, always allowing, of course, for the variation in the phenomenon of inflation due to differences in banking and currency systems. In France a moratorium was declared shortly after the outbreak of the war and this affected deposits as well as notes. It, however, was soon ended, but at no time during or since the war have Bank of France notes been made convertible into coin. On the other hand, large support has had to be given by the Bank of France to the government. All this led to an enormous increase in the note circulation (consisting of the issues of the Bank of France), but no considerable change in the actual structure of banking took place. Provisions for the official control of exchange and forbidding the export of capital were early introduced and have continued in effect. In Germany the shock to the banking system caused by the war was quite as severe as anywhere else but technically produced no great change during the continuance of the struggle. Early in August, 1914, the government provided for a legal tender currency which however was later retired and its place was taken by notes of the Reichsbank. All notes and currency were declared inconvertible and a special type of loan banks was established. After the close of the war the loss of gold and the necessity of resorting constantly to the aid of the Reichsbank tended to drive the mark further and further downward until early in 1922 it reached a level in the New York market of $\frac{3}{10}$ of a cent. In other European countries central banking systems had been established more or less upon the lines indicated by the experience of the Bank of England. All of these systems were more or less affected by the war and in practically all there was a suspension of specie payments which has continued to the present date. Practically all of these systems of banking are today subject to possible change as the problem of restoring a solvent condition in the different European countries is worked out. Both currency and banking conditions throughout Europe are so unsettled that the exact future course of events can hardly be predicted.

**Colonial and Oriental Banking.** The type of banking developed in Great Britain and the United States which may be described as deposit banking under central control has gradually made its way into most parts of the world in a more or less modified form. An off-shoot of the British banking system is seen in the banks of Canada where 17 institutions each vested with the note issuing power are allowed to establish branches practically as they choose throughout the entire country. The result has been to bring about at the same time a very substantial degree of central banking at the same time preserving many of its competitive features. The Canadian banks protect the public in so far as note issues are concerned by the establishment of joint guaranty of note issue, the entire outstanding note issue being the first lien upon the assets of all banks and being protected in addition by a guaranty fund placed with the Dominion Government. These notes are freely issued without limit up to the capital of the issuing banks and they supply what is today the best example of a typical "asset secured" bank currency in the world.

Another form of the British banking system is seen in Australia where about 25 banks, some with head offices in London and branch offices in Australia, others with head offices in Australia and branches in London, have developed an efficient system of deposit and note banking with thousands of connections scattered throughout the country. Centralization there is afforded through a government bank, the so-called Commonwealth Bank which holds the public funds, and which, while not ordinarily undertaking sharp competition with the other banks, does not hesitate to make its rate of discount more or less effective by doing a regular commercial banking business and by buying and selling paper and at times entering into banking relationships with the other banks of the commonwealth.

In other British colonies, there has been a local development of banking somewhat along the Australian lines, although in South Africa culminating in the Reserve Bank of South Africa; or in still others carried on by means of branches established by British capital and operating on an international basis. Good examples of the latter are seen in the banking systems of the China coast ports where the Honkong and Shanghai, the Chartered Bank of India, Australia and China and others have established a net-work of branches closely operating under the general direction of head offices. These banks, while transacting considerable deposit business, derive a large profit from the circulation of their note issue among the population and also devote themselves in a primary degree to foreign exchange operations, financing the import and export of commodities on a short time basis and speculating in silver.

In Japan, the Bank of Japan bears somewhat the same relation to other privately owned banking institutions as does the Bank of England, has sole power to issue notes on the mainland of Japan and generally exerts a control over the discount market which, however, is in a somewhat rudimentary condition.

**South American Banking.** In South America various banking systems largely patterned after those in Great Britain and Germany prevail. Working in combination with the branches of British, French, German and Italian (overseas) banks, these local or native institutions provide a more or less thorough and satisfactory system of local banking which is the more effective because of the fact that the trade and industry of the South American countries are largely based upon exportation and importation, the exports consist of the staple raw commodities of these countries, while imports consist of consumable commodities brought from abroad. The general problems of banking in South America are special because of the long term character of the credit which is frequently required there and because of the fact that so large a share of the business consists of export and import financing, but in structure and organization the banking systems of these countries follow closely the European models.

**War Changes in Foreign Banking.** The European war naturally affected the banking systems of all nations very profoundly resulting in most countries in an enormous expansion of credit both in the form of notes and of deposits, while practically everywhere the banks of the several countries became overloaded with government securities of various kinds either purchased for their own account or taken as collateral behind paper which had been left

with them by customers for the purpose of carrying these bonds pending gradual liquidation of subscriptions to them. Another financial feature of the war was the almost immediate imposition of a gold embargo and in most countries the expansion of bank paper into gold. These conditions naturally removed the ordinary and normal restraint upon the growth of bank credit and tended to aggravate the dangers of unsoundness which always present themselves in such circumstances even without the presence of urgent war demands. While, therefore, there was but little progress in banking organization or banking structure during the war, there was very great modification of the character of the business done by the several banks and very great change in their reserve and character of outstanding liabilities. As the war progressed, gold, which had been carefully conserved through the measures just indicated, had in many cases to be exported so that Germany, Austria-Hungary and most of the southeastern States of Europe lost their gold supplies as a result of payment of international obligations or shipments of gold made necessary by the urgent requirement of raw materials or foodstuffs. Russia, in the meanwhile, had under Bolshevik rule practically abandoned or destroyed the entire structure of banking and credit which had been developed during the prewar period, and the great stock of gold in Russia was largely exported during the latter part of the war and during the post war inflation period which succeeded. The situation in the principal countries of Europe may be best understood from a survey of the currency and deposit situation of some of the principal States at about the close of 1921 as contrasted with their reserve stocks, the whole being compared with prewar figures.

Consult: Bagehot, *Lombard Street* (New York, 1874); Conant, *A History of Modern Banks of Issue* (New York, 1897); and id., *Principles of Money and Banking* (New York, 1905); Dunbar, *Theory and History of Banking* (New York, 1891; enlarged edition edited by Sprague, New York, 1906); Francis, *History of the Bank of England* (London, 1848); White, *Money and Banking* (Boston, 1896); *Report of the Monetary Commission* (Chicago, 1898); Fiske, *The Modern Bank* (New York, 1904); Steele, *Present-Day Banking* (London, 1909); Morawetz, *The Banking and Currency Problem in the United States* (New York, 1909); Muhleman, *Government Supervision of Banking Throughout the World* (New York, 1911); *Reports of the National Monetary Commission* (Washington, 1910–11); *Reports of the Comptroller of the Currency;* Kirkbride, Sterritt and Willis, *Modern Trust Company* (New York, 1921); Willis and *Edwards, Banking and Business* (New York, 1922); *Reports of Federal Reserve Board*, 1914–21; *Currencies After the War* (London, 1920). See also CREDIT; CURRENCY; INTEREST; SAVINGS BANK.

**BANK BILLS, or NOTES.** The promissory notes of a bank or banker, issued under special legal authority, payable to bearer on demand. They differ from an ordinary promissory note in two important particulars: they may be reissued after payment, and they do not become stale, or overdue, by the expiration of a reasonable time after their issue. Bank of England notes are a legal tender in England for all sums exceeding £5, except by the bank. In the United States bank bills are not a legal tender. Whether a demand or payment must be made before an action can be brought on a bank bill is a question upon which the decisions in the United States are in conflict. Consult the authorities referred to under BANK, BANKING.

**BANK DISCOUNT.** See BANK, BANKING.

**BANK HOLIDAYS.** In law, days on which obligations, such as promissory notes or bills of exchange, may not be demanded so as to put the maker or payer thereof in default. In England every Sunday, Christmas Day, Good Friday, Easter Monday, the Monday in Whitsun Week, the first Monday in August, the 26th of December (called *Boxing Day*), or, if that day is Sunday, the 27th, or any day appointed by Order in Council in place of either of the last four days, and any day appointed by royal proclamation as a public fast or thanksgiving day, are bank holidays. Banks are to be kept closed on such days, and bills and notes payable on any of these days are declared payable on the next following business day. In the United States Sundays and public holidays (q.v.) are, as a rule, bank holidays; and negotiable paper payable on such day, without grace, is payable the next business day. If it is entitled to days of grace (see BILL OF EXCHANGE), and the last day of grace falls on a public holiday, it is payable on the last preceding day, in the absence of a statute varying this rule. Such statutes, making the bill or note payable on the day following instead of the day preceding the holiday, where the last day of grace falls on the holiday, have been enacted in several of the United States.

**BANKIPUR.** A civil station adjoining the city of Patna (q.v.), British India.

**BANK NOTES, MANUFACTURE OF.** The chief aim in the manufacture of bank notes is to render counterfeiting impossible, or, at least, easy of detection. This is usually accomplished by peculiarity of paper, design, ink, and printing, or by a combination of these means. English bank notes are printed with the blackest and most indelible ink on a peculiar kind of handmade paper bearing a distinctive watermark. (See PAPER.) As a further security against counterfeiting, a self-registering machine is used for impressing upon the note a mark known only to the Bank of England officials. Until 1837 copperplate printing was employed for English bank notes; and from 1837 to 1855 the method of Perkins Heath for the reproduction of designs by the mill and die process was employed. The great advantage of this method was that a large number of steel plates of the same pattern could be produced from an original with comparative ease. In 1855 electrotype printing was introduced by Smee and the mechanical officials of the Bank of England, and since that time all English bank notes have been printed from the electrotype plates.

The extensive use of Treasury notes or other forms of paper currency in the United States led the Bureau of Engraving and Printing of the Treasury Department at Washington to develop methods for producing notes which should not only be difficult to counterfeit, but which should be legible, durable, and artistic in design. In many instances celebrated artists have been engaged to furnish designs for notes; but more generally the designs have been prepared by the artists belonging to the Bureau. Whoever the designer may have been, the work of transferring the design to the plate, and the entire mechanical

production of the note, except the manufacture of the paper, is carried out by the Bureau.

The paper is made by a private concern only for the government, the process of manufacture being patented. It is made by machinery and is tougher than that of the Bank of England, which is made by hand. The principal ingredients of the paper are linen and cotton fibre, into which threads of silk are introduced lengthwise in the sheets in such a manner as to be visible in the printed note. The process of manufacture, as carried on at the Bureau of Engraving and Printing, is as follows:

The design of the note, including all the lettering and devices thereof, upon a sheet of the required form, being in the hands of the workmen, they first proceed to make the die. A plate of soft, highly polished steel is selected, and upon it is sketched the design, or such portions of it as are of the same color, if more than one tint is to be used in printing. A separate die is needed for every shade used. This is then carefully engraved. It will be understood that, unlike the method of wood engraving, the lines which take the ink are cut into the plate instead of being raised above its surface. The engraver is limited to such parts of the work as can be done by hand; other portions, such as the fine scrolls and elaborate tracery, are done entirely by machinery. The principal apparatus used is a complicated piece of mechanism, which actuates a plate to which the steel for the die is attached and caused to press against a diamond point. This is known as a cycloid ruling machine and is employed for the straight work. Perfectly true and delicate lines are thus cut into the metal, making figures technically termed "cycloid rosettes." The geometric lathe used for the elaborate work on the back of the different denominations of paper money requires the services of an expert mathematician to figure out the succession of curves, and once the combination is changed the original figure in its detail never can be reproduced.

The die, being complete, is ready for the transfer process. Postage stamps, for instance, are made in sheets of 200, so that the die must be transferred that number of times on a single plate. It is first casehardened and then put, face up, in a press which is made with a combination of levers actuated by the foot, so as to give the tremendous pressure of 21 tons on a single line. A cylinder or "roll" of soft steel is, by careful gauging, placed so as to rest directly over the face of the die and at the same time is so arranged as to revolve easily along its surface even when under the full weight. The pressure is then applied, with the result of forcing the soft steel of the roll into the lines of the engraving, so that, when complete, the periphery of the cylinder shows an exact reproduction of the face of the die, only the lines sunk on the die are now raised on the roll. Next, the cylinder is casehardened. Then the plate—soft steel again—to be used for the final printing is placed in the press, and the roll is arranged above it. Now the cylinder leaves its impression on the plate, the hard steel of the raised lines cutting deep into the surface, so that a precise duplicate of the original die is obtained. This is repeated as many times as there are to be repetitions of the stamp or note on the single plate, which is then ready for use.

The ink for printing is made on the spot. In a large room are ten or a dozen paint mills, which are busily grinding the colors and oil together. Two large ones are filled with green ink, another with vermilion, while others are making blue, red, and other tinted inks.

The next important department is the paper-room, where the paper is received and cut in sheets of the required size. The notes are made of a peculiar material containing colored fibres. The paper for postage stamps is made of the best linen. It is of short fibre, very fine, and extremely strong. The sheets on which currency is to be printed are counted as soon as received, and the results reported for verification. They are placed in heaps, marked off in sets of 100 and 1000.

The Bureau of Engraving and Printing employs both hand and power presses, steam presses being used exclusively for printing the backs of treasury and bank notes and for revenue and postage stamps. In the power presses the operations are practically the same as with the hand presses, but are performed automatically by the press itself. The more recent types of power presses print from plates bent in cylinder form.

As soon as a printer has completed the work assigned to him he hands it, made up in "books" of 100 impressions, each sheet inclosed between two others of brown paper, to a clerk. He is then credited with his delivery, spoiled sheets being counted the same as perfect ones, so that if his return is correct his debit account on his pass book, which is kept in a different apartment and by other employés, is thus balanced. The finished impressions are now carefully counted and inspected. A day's work for a hand printer consists of from 800 to 1000 impressions, each sheet containing four bills. The spoiled ones are removed and sent to the proper agents to be burned, while the others are hung in the drying room. This apartment is heated by steam pipes, and the paper is suspended by wires for a day or two, until perfectly dry. Then the brown paper is removed, and the sheets, packed between leaves of press-board, are subjected to the action of a powerful hydraulic press. They are then once more inspected and counted. The entire process of printing requires about one month, and each sheet is counted about 50 times before the packages of 1000 are transferred to the vaults of the Treasury Department.

**BANKHEAD**, JOHN HOLLIS (1842–1920) An American public official and legislator, born in Moscow, Ala., and educated in the public schools. After four years of service with the Confederate army in the Civil War he entered politics. In 1865–67, and again in 1880–81, he was a member of the Alabama House of Representatives, and in 1876–77 a State Senator. He held the position of warden of the Alabama penitentiary from 1881 to 1885. Soon afterward (1887) he was elected to the Fiftieth Congress, and from that time until 1907 he served continuously. In the latter year he was appointed a member of the Inland Waterways Commission. At the Democratic primaries in Alabama in 1906 he had been nominated an alternate Senator to succeed J. T. Morgan in event of the latter's death (see ALABAMA, *History*), and consequently in June, 1907, Senator Morgan having died, Bankhead was appointed United States Senator, and in July was elected by the Legislature. He was reëlected in 1911 for a full term of six years, beginning March 4, 1913.

**BANK OF NORTH AMERICA.** See BANK, BANKING.

**BANK OF THE UNITED STATES.** See BANK, BANKING.

**BANK'RUPTCY** (*bank* + Lat. *ruptus*, broken, from *rumpere*, to break, It. *banca rotta*, usually taken to refer to the former Italian custom of destroying the money counter when a bank failed). In popular usage, the inability of a person to pay his debts, or the financial condition of one who has failed in business; as a technical law term, the status of one who has been adjudged a bankrupt.

The legal position of a debtor in primitive communities is one of great hardship. He is at the mercy of his creditor, who, after exhausting the property of the debtor, may generally seize his body and force him to work out the debt or become a slave. With the development of society various devices are resorted to for the amelioration of the debtor's condition, terminating, as a rule, in a more or less satisfactory system of bankruptcy, the cardinal principle of which is that one who is unable to pay his debts in full may be discharged therefrom upon giving up all his property for ratable distribution among his creditors. The history of bankruptcy and insolvency legislation in England furnishes a good illustration of this statement. While it is true that there was no process of the common law by which a man could pledge his body or surrender his liberty for the payment of his debts, the courts permitted a legal fiction to grow up that a debtor who did not pay a judgment against him was guilty of a breach of the peace, subjecting his body to imprisonment by the writ of *capias ad respondendum*. The first bankruptcy act in England was passed about the middle of the sixteenth century. It reflects the harsh and unfeeling attitude which the propertied classes, which controlled the courts and the legislation of that period, entertained toward the insolvent debtor. This act (34 and 35 Hen. VIII, c. 4) was entitled "Against such as do make Bankrupt," and recites that "divers and sundry persons, craftily obtaining into their hands great substance of other men's goods, do suddenly flee to parts unknown, or keep their houses, not minding to pay or restore to any, their creditors, their debts and duties, but of their own wills and pleasures consume the substance obtained by credit of other men for their own pleasure and delicate living, against all reason, equity and good conscience." It then proceeded to confer upon various judicial officers power to take the offending debtors and their property; to sell the latter, and to divide the proceeds ratably among creditors. Under Elizabeth and James I additional bankruptcy statutes were passed, all keyed to the same note of suspicion and harsh judgment of the failing debtor. The Act of 21 James I (c. 19) was especially severe, providing that the debtor who could not render some just reason why he became bankrupt should stand upon the public pillory, have one of his ears nailed thereto, and then cut off. If his failure to pay his debts was due to fraudulent practices, he might be put to death.

With the growth of English trade the hazards of commercial enterprises were so multiplied, and the complexity of business relations so increased, that this Draconian legislation against failing debtors was found to be not only unjust but impolitic. Accordingly bankruptcy laws underwent a radical change, until, in Blackstone's time, they were considered "as laws calculated for the benefit of trade, and founded on principles of humanity as well as justice; and to that end," adds the great commentator, "they confer some privileges, not only on the creditors, but also on the bankrupt or debtor himself. On the creditors, by compelling the bankrupt to give up all his effects to their use without any fraudulent concealment; on the debtor, by freeing him from imprisonment and discharging him from his debts, if he had been honest."

These laws, however, applied only to traders, because it was thought that they were, "generally speaking, the only persons liable to accidental losses," and that it was "an unjustifiable practice for any person but a trader to incumber himself with debts of any considerable value." Those who were not traders could get relief from imprisonment for debt only to the extent provided by an entirely distinct set of statutes, those relating to insolvency (q.v.). Although Blackstone describes the bankruptcy laws of his age in the most optimistic vein, deeming them, as he did almost every other branch of English law, the perfection of human reason, they have been modified repeatedly during the last 100 years. Thirty-eight bankruptcy acts have been passed in England, beginning with that already mentioned under Henry VIII, and, for the present, closing with the Act of 1883, as amended in 1890. These statutes have been a series of experiments, and although the latest had for its motto, "The estate for the creditor, not for the debtor, nor for the trustee," it cannot be considered a finality, for it has not accomplished its avowed purpose of satisfying the creditor class. This is shown by the fact that nearly one-half of the business insolvencies in England are liquidated under deeds of settlement or voluntary compositions with creditors outside of the bankruptcy court.

Under the present bankruptcy acts in England and in the United States, proceedings in bankruptcy may be instituted by the debtor or by creditors. The former is called a voluntary, the latter an involuntary proceeding. Each is begun by filing a petition. The debtor's petition must state that he is unable to pay his debts and is willing to surrender all of his property to the use of his creditors. Whether a person is liable to be adjudged a bankrupt upon the petition of creditors depends upon his having committed an act of bankruptcy. The United States Bankruptcy Statute of 1898 as amended in 1903 enumerates five classes of acts of bankruptcy. First, conveying, or removing, or permitting to be removed, any of his property with the intent to defraud any of his creditors; second, transferring, while insolvent, any of his property with intent to prefer a creditor; third, suffering, while insolvent, any creditor to obtain a preference through legal proceedings, and not securing the discharge of such preference; fourth, making a general assignment for the benefit of creditors; or, being insolvent, applying for a receiver for his property, or because of insolvency having a receiver put in charge of his property; fifth, admitting in writing his inability to pay his debts, and his willingness to be adjudged a bankrupt on that ground.

After the debtor is adjudicated a bankrupt, a trustee is appointed by the creditors (subject to some supervision by the Board of Trade in England, by the bankruptcy court in this country), who becomes vested not only with all the prop-

erty in possession of the debtor at the time when he was adjudged a bankrupt, but with all that he had transferred in violation of the statute or in fraud of creditors. It is important that the trustee's title should relate back of the adjudication. By providing for the relation back of the trustee's title, every transfer of his property made or suffered by an insolvent debtor, with intent to prefer a creditor over others, within three months in England, four months in the United States, before the filing of the petition in bankruptcy, is rendered invalid, and the property may be brought back into the estate for division among creditors. Moreover, even when a creditor has obtained security from the debtor, which is not invalidated by the statute, he is not allowed to share in the bankrupt's estate unless he turns over the security to the trustee, or deducts from the amount of his claim the value of his security. It is the duty of the bankrupt to make a full disclosure and surrender of his property, save such as is exempted by statute, as well as to supply a full and honest list of his creditors. Upon establishing their claims, in the prescribed manner, the creditors are entitled to take part in the meetings provided for by statute, as well as to receive dividends. The debtor may be punished criminally for certain violations of the bankruptcy law; and a discharge from debts will be denied for various reasons. Under the present Federal statute it will be denied if he has committed an offense punishable by imprisonment, as provided therein, or if he has fraudulently destroyed, concealed, or failed to keep books of accounts, or records, showing his true financial condition, or obtained property on credit by a materially false statement in writing, or within four months prior to petition transferred, or removed, destroyed or permitted to be removed, destroyed, or concealed, property with intent to defraud, or in voluntary proceedings been granted a discharge in bankruptcy within six years, or in the course of the proceedings in bankruptcy refused to obey any lawful order of the court. Even when a discharge is obtained, it does not relieve the bankrupt, as a rule, either in England or here, from debts grounded in fraud or other moral misconduct. In this country no political disability follows an adjudication in bankruptcy. In England, however, an adjudged bankrupt is disqualified from sitting or voting in either house of Parliament or from holding various other specified offices. This disqualification ceases as soon as the bankrupt is discharged, if the court certifies that he was free from misconduct, and at the end of five years from a discharge in other cases.

Article I, Sec. 8, of the Federal Constitution, gives to Congress power "to establish . . . uniform laws on the subject of bankruptcies throughout the United States." This grant of power to Congress does not exclude the States from legislating on this subject, but a Federal bankruptcy statute suspends while in force, the operation of a State statute covering the same ground. Congress has exercised this power but sparingly. It passed the first bankruptcy law in 1800. This was copied quite closely from the English statute of that time. As it applied only to traders, it soon became unpopular with other classes and was repealed in 1803. The next venture in bankruptcy legislation by Congress was made in 1841, at the request of insolvent debtors, who, after the panic of 1837, had become a numerous and influential class. This bill proved no more satisfactory than its predecessor, and it was repealed after a short life of two years. After the repeal of this act no serious attempt was made to pass a Federal bankruptcy law until 1864, when Congressman Jenckes, of Rhode Island, introduced a bill upon this subject. His very instructive speech, explanatory of its purpose and provisions, is contained in the *Congressional Globe* for 1863–64, at page 2636. The bill met with serious opposition and did not become a law until June, 1867. In 1874 it was amended in various respects. One of the changes required one-fourth in number and one-third in value of the creditors to unite in an involuntary petition. This made it very difficult for creditors to force a debtor into bankruptcy, and thereafter the proceedings were mainly voluntary. Moreover, the charges upon bankrupt estates under this law were heavy, often exorbitant, and the creditor class was disappointed in its workings. Their agitation for its repeal was crowned with success in 1878.

Twenty years elapsed before the fourth and present Act was passed by Congress in 1898 (amended by subsequent acts of Congress in 1903, 1906, and 1910). It was the outcome of a compromise between the friends of a bill fashioned largely after the present English statute, and those who were either opposed to any Federal legislation on the subject, or were anxious to limit such legislation within the narrowest possible bounds. Its definition of acts of bankruptcy is much narrower than that of the English statute. Even one who has committed an act of bankruptcy may defeat an adjudication by convincing a jury that the aggregate of his property is, at a fair valuation, sufficient in amount to pay his debts. It secures, however, a fairly expeditious, convenient, and economical administration of bankrupt estates. While the Federal district courts have original jurisdiction in bankruptcy, the statute provides for referees, who may perform many of the judicial duties in bankruptcy proceedings, and whose districts are not to extend, as a rule, beyond the limits of a single county, thus making it easy for suitors to attend upon the proceedings. Consult: Brandenburg, *Law of Bankruptcy* (3d ed., Chicago, 1903); Bump, *Law and Practice in Bankruptcy* (11th ed., Washington, 1898); Collier, *Law and Practice in Bankruptcy* (9th ed., Albany, 1912); Baldwin, *Concise Treatise upon the Law of Bankruptcy* (8th ed., London, 1900); Robson, *Treatise on the Law of Bankruptcy* (7th ed., London, 1894).

**BANKS,** Sir Joseph (1743–1820). An English naturalist. He was born in London, Feb. 13, 1743, the only son of William Banks and Sarah, daughter of William Bale, who left him a large fortune. He graduated at Oxford, imbued with a profound interest in natural history, and it was by his exertions that lectures in natural history were first introduced into that university. In 1766, after having been elected a fellow of the Royal Society, he began his travels by a journey to Newfoundland and Labrador to collect plants, whence he brought the first scientific collections from that region. In 1768–71 he accompanied Cook's expedition round the world in a vessel, the *Endeavour*, equipped by himself, in which he visited successively Rio de Janeiro, Cape Horn, Tahiti, New Zealand, Australia, the Malay Archipelago, Cape of Good Hope, and St. Helena. His friend, the botanist Solander, and two artists accompanied him on this expedition.

Botany Bay and the Endeavour River were named at this time, and Cook also gave the name of Banksland to an island south of New Zealand. During this visit to Tahiti Banks sowed seeds of various Brazilian plants. The death of Dr. Solander long delayed the publication of the manuscripts and plates of the botanical results of the expedition, which were preserved in the British Museum, and finally published in 1900. As one result of this expedition the marsupial fauna of Australia first became known to science. In 1772 Banks explored the Hebrides and Iceland and discovered the great geysers of the latter country. He was elected president of the Royal Society in 1778, which office he held for 42 years. While he published little himself, he did much to arouse an interest in natural science in Great Britain and was a patron and protector of scientists in general. His great collections and library, now preserved in the British Museum, were accessible to naturalists and were the basis of many important systematic works by Fabricius, Broussonnet, Gärtner, and Robert Brown. He married Dorothea, daughter of William Weston-Hugessen, in 1779, but left no children. He died in Isleworth, Jan. 19, 1820. Consult Duncan, *Short Account of the Life of Sir Joseph Banks* (Edinburgh, 1821), and *Sir Joseph Banks and the Royal Society* (London, 1846).

**BANKS,** Louis Albert (1855– ). An American clergyman and author. He was born at Corvallis, Ore., and educated at Philomath College, Ore., and at Boston University. In 1893 he was the Prohibition candidate for governor of Massachusetts and afterward became an evangelist for the American Anti-Saloon League. A few of his very numerous writings are: *Religious Life of Famous Americans* (1904); *Spurgeon's Illustrative Anecdotes* (1906); *The Problems of Youth* (1909); *The World's Childhood* (1910); *The Great Themes of the Bible* (1911); *The Lincoln Legion* (1912).

**BANKS,** Nathaniel Prentiss (1816–94). An American soldier and politician, born at Waltham, Mass., where he received a common-school education and learned the trade of a machinist. He then edited a local paper; studied law and was admitted to the bar; served several terms in the Massachusetts Legislature, for part of the time as Speaker of the Assembly, and in 1853 was chairman of the Massachusetts Constitutional Convention. In 1853, also, he was elected to Congress by a coalition of the Democrats and Free-Soilers, but soon joined the "Know-Nothings" and afterward identified himself with the newly organized Republican party. During his second term in Congress he was Speaker of the House, having been chosen on the 133d ballot. He was Governor of Massachusetts from 1857 to 1859 and then became president of the Illinois Central Railroad, which position, however, he resigned on the outbreak of the Civil War, to enter the Federal service. He was commissioned major-general of volunteers on May 16, 1861; commanded the Fifth Army Corps along the upper Potomac and in the Shenandoah valley in 1861–62, and on March 23, 1862, a part of his army under Shields defeated Jackson at Winchester. In April, 1862, at the head of two divisions, he was assigned to the task of protecting the Shenandoah while McClellan proceeded against Richmond by way of the Peninsula; but, soon weakened by the withdrawal of one of his divisions, he was defeated by Jackson at Front Royal on May 26 and was forced back upon the Potomac. Soon afterward he joined Pope, then commanding the Army of Virginia, and on August 9 was defeated by a force of Confederates in the battle of Cedar Mountain. He then was in command for a time of the defenses of Washington, and in December, 1862, commanded the expedition to New Orleans and replaced Gen. B. F. Butler as commander of the Department of the Gulf. In the spring of 1863 he conducted the campaign against Port Hudson (q.v.), which, after resisting several assaults, was finally surrendered, July 9, 1863, on the receipt of the news that Vicksburg, farther up the river, had been taken by Grant. Early in 1864 General Banks was directed to lead an expedition up the Red River, with a view to regaining western Louisiana from the Confederates, but he was defeated by Gen. Richard Taylor at Sabine Cross Roads and was forced to withdraw to the Mississippi. In May, 1864, he was relieved of his command and, resigning his commission, was again elected to Congress, where he served, with the exception of one term, until 1877 and was for many years chairman of the Committee on Foreign Relations. He was again elected to Congress in 1888, but after 1890 suffered from a mental disorder and withdrew wholly from public life. In 1891 Congress voted him an annual pension of $1200. Because of his factory life when a young man, he was popularly known as "the Bobbin Boy."

**BANKS,** Thomas (1735–1805). An English sculptor. He was born at Lambeth and studied in the classes of the Academy, whose gold medal enabled him to prosecute further study at Rome. He remained in Italy from 1782 to 1789 and executed, among other works, the marble "Cupid Catching a Butterfly," which was acquired by the Empress Catharine of Russia during the artist's sojourn at St. Petersburg. She also gave him another commission for a group called "Armed Neutrality." On his return to London he was in 1785 elected to the Royal Academy. Several of his monuments are in Westminster Abbey and St. Paul's; in the latter is his statue of Lord Cornwallis. His most ambitious effort is his plaster model of "Achilles Mourning the Loss of Briseis." Among his other works is "Shakespeare between the Tragic and Comic Muses" in Stratford-on-Avon. Banks has been called the father of English ideal sculpture, but he may be best classed as a mediocre forerunner of the classic art of Thorwaldsen and Flaxman.

**BANKS,** Sir William Mitchell (1842–1904). A Scottish surgeon and anatomist, born in Edinburgh. He graduated in 1864 at Edinburgh University, was demonstrator of anatomy in the University of Glasgow, and subsequently at Liverpool, in 1868, became known as a consulting and operating surgeon. He reëstablished the Medical School of Liverpool and founded University College, one of the three colleges constituting Victoria University. For some time he was professor of anatomy in University College. In 1886 he was elected first president of the Liverpool Biological Society, and in 1897 delivered the address in surgery before the British Medical Association assembled at Montreal. He was one of the originators of the modern method of operating for cancer of the breast. His publications include various papers and addresses.

**BANK'SIA.** A genus of Australian shrubs of the family Proteaceæ, named in honor of

Sir Joseph Banks. A few of the species become small trees. They have hard, dry leaves and present a remarkable appearance from the umbellate arrangement of their branches. These bear toward their extremities oblong heads of very numerous flowers, which secrete much honey. Some of the species are frequently grown as greenhouse plants in Great Britain. They are abundant in all parts of Australia, forming a characteristic feature of its vegetation, and are called honeysuckle trees. *Banksia grandis* exceeds all the rest of the genus in size, attaining a height of 50 feet.

**BANK-SIDE.** The south bank of the Thames, between Blackfriars and Waterloo bridges, London. Here stood the famous Globe Theatre in Shakespeare's time.

**BANKS IS'LANDS.** A group of islands in the Pacific, a dependency of New Hebrides (q.v.) (Map: Australasia, J 4). They number 17 and are situated in lat. 13° S. and long. 168° E. The most important of them are Vanua Lava, St. Maria, Ureparapara (with a good harbor), and Valua. Spices, corn, and coffee are among the important products, and the islands are famous for valuable rosewood. These islands were discovered by Bligh. There is a mission house on the small islet of Mota. The total area of the group is estimated at about 150 square miles, and the population at 5000.

**BANKS LAND.** An island in the Arctic Ocean, 70 miles southwest of Melville Island (Map: Arctic Regions, D 7). It is intersected by the parallel of 74° N. and by the meridian of 120° W. It was discovered by Parry in 1819.

**BANKS STRAIT.** See Map: Tasmania, E 1.

**BANK SWAL'LOW, or SAND MAR'TIN.** This familiar swallow is perhaps the most widespread of all land birds, ranging over most of the Northern Hemisphere. In North America it breeds as far north as the limits of trees and migrates south to Peru and Brazil. It is found also throughout Europe, northern Asia, and China, wintering in Africa, India, and the Indo-Burmese countries. It is known under one or another name throughout nearly the whole world, wherever the cut banks of streams give it an opportunity to make its burrowed nesting place. The common species of America, Europe, and Asia is *Clivicola* or *Riparia riparia.* From eastern India to southern China it is replaced by another species (*Clivicola* or *Riparia sinensis*), which migrates in winter to the Philippines and southern India. Egypt has another species (*Clivicola* or *Riparia shelleyi*); the brown-collared bank swallow (*Clivicola* or *Riparia cincta*) abounds throughout tropical Africa, and several other forms are recognized elsewhere, but all are closely alike in appearance and habits.

The bank swallow is easily distinguishable from all other American swallows by its lesser size and the absence of metallic lustre in its plumage, which is sooty brown-black above and white on the lower surface of the body, with a dusky band across the breast; the beak is very small and weak, and the tail short and not deeply forked. This swallow is migratory in the temperate zone, where it spreads in summer to the borders of the Arctic Ocean, and retires in winter not only to the tropics, but beyond them to the southern parts of South America and Africa, but its alleged breeding there is probably erroneous, arising from confusion with local resident species. Everywhere it is of local distribution, seeking the borders of water courses and lakes where steep banks of sandy earth afford it a chance to dig holes, which it does in companies sometimes numbering hundreds of pairs, whose homes are often crowded within a small space. Seven hundred holes have been observed in Alaska in the face of a single sand bluff. The nests are placed at the inner ends of deep burrows, each made by a pair of birds. In excavating the feet seem to be the principal instruments, scratching away the soil and scraping it out backward to the mouth of the hole, until the required calibre and depth are attained. Both sexes work at the task diligently, and the hole is sometimes 7 or 8 feet in depth—a wonderful achievement for a bird so weak and ill-provided with digging tools. A swallow of similar nesting habits, but otherwise quite different, is the Rough-winged (q.v.). See SWALLOW and Plate of SWALLOWS.

**BANN.** A river in Ireland, rising in the southern part of Downshire. It flows northwest, passing through Lough Neagh at its southwestern end, then passes between the counties of Londonderry and Antrim, and falls into the Atlantic at Port Stewart. The part of the river south of Lough Neagh is called the upper Bann and has a length of 25 miles, while the lower Bann, or the part north of Lough Neagh, is about 40 miles long. The Bann is navigable for light vessels and has salmon fisheries. It is connected with the Newry Canal at Portadown.

**BANNATYNE** (băn'ă-tīn) **CLUB.** A club founded in 1823 by Sir Walter Scott, who was its first president, and by other Scottish antiquarians, for the purpose of collecting and publishing all history and literature connected with their country. It was named after a sixteenth-century collector of Scottish poetry, and seems to have been discontinued in 1867. It printed 116 rare works in editions of 100 copies each, which were distributed among the members. A full set of these works brought £235 in 1887.

**BAN'NEKER,** BENJAMIN (1731–1806). A negro mathematician. He was a native of Maryland and was a protégé of Thomas Jefferson. His grandmother, an Englishwoman, taught him to read and write; and after his fiftieth year he began to study mathematics with special reference to astronomy. In 1792 he issued an almanac of his own making and continued the series annually throughout his life. He assisted in fixing the boundary lines of the District of Columbia and in laying out the city of Washington. For his biography, consult Latrobe (Philadelphia, 1848), and Morris (Baltimore, 1854).

**BAN'NER** (OF. *banere, baniere,* Fr. *bannière, bandière,* LL. *baneria, banderia,* from *bandum,* standard; cf. Goth. *bandwa,* sign, token, OHG. *bant,* band). Strictly, a kind of flag painted or embroidered with arms, and of a size proportioned to the rank of its bearer; often fringed with the principal metal and color of the arms. The chief distinction between banners and other flags, such as standards, pennons, etc., is that the former is square, or nearly so, while the others are, as a rule, elongated. See ENSIGN; FLAG; STANDARD.

**BAN'NERET** (OF. *baneret, banneret,* from *banere,* banner). A knight entitled to display a banner, as distinguished from a pennon. The honor was originally gained in feudal times by bringing a certain number of soldiers into the field, but later became the reward of heroic acts performed in the face of the enemy. The first

banneret in England, according to Froissart, was made by King Edward I, and the last by Charles I, after the battle of Edgehill, the recipient being John Smith, who had recovered the royal standard from the insurgents. There are three doubtful instances, however, of the bestowal of this honor in the eighteenth century. At the creation of a knight banneret the king, or his general at the head of his army drawn up under the royal banner in battle array after a victory, attended by all the officers and nobility of the court, received the banneret-elect, not necessarily a knight previously, led between two knights of note or other men famous in arms, carrying his pennon in his hand, the heralds walking before him and proclaiming his valiant achievements for which he deserved to be made a knight banneret and to be privileged to display his banner in the field. The king, or general, would then say to him, "Advance, banneret!" and cut off the point of his pennon, thus altering its shape to that of a banner (q.v.). The new knight, with the trumpeters sounding before him and the nobility and officers bearing him company, would next be sent back to his tent, where a noble entertainment, provided by the king, awaited him.

**BAN'NOCK** (Gael. *bonnach, bannach*). A cake of home-made bread formerly common in the country parts of Scotland and in the north of England. It is usually composed of pease-meal or pease and barley meal mixed; prepared without any leaven, it is baked on a circular plate of iron called a girdle. When made of mixed meal, it is called a "mashlum bannock." "Bannocks of barley meal" form the theme of a popular Scottish song.

**BANNOCK.** See BANAK.

**BAN'NOCKBURN** (Gael. the stream of the white knoll; *burn*, AS. *burna*, a small stream; cf. Ger. *Brunnen*, well). A village in Scotland, about 2¼ miles southeast of Stirling, on the Bannock Rivulet, the scene of a great battle, fought on June 24, 1314, in which Robert Bruce, with c.40,000 Scotch, gained a signal victory over Edward II with 100,000 English, and secured his throne and the independence of Scotland. The victory was due in great measure to the clever device of Bruce, who caused the ground in front of his position to be undermined in all directions. The English cavalry blundered into the hidden pits, were rendered helpless, and threw the rest of the army into confusion. The English are said to have lost 30,000, and the Scotch 5000, men. The "bore stone" on which Bruce is said to have fixed his standard on that day is still to be seen on an eminence near the scene of the fight. On the southeast of the field of Bannockburn, at Sauchie Burn, James III was defeated June 11, 1488, by his rebellious subjects, and assassinated after the battle at Beton's Mill, where he had taken refuge. See SCOTLAND.

**BANNS** (earlier also *bannes*, pl. of *ban*) **OF MARRIAGE.** The preliminary public announcement or proclamation constituting a part of the religious ceremonial of marriage. It was made compulsory throughout Christendom by a decree of Innocent III at the fourth Lateran Council of 1215 and is still employed, both in England and in most Roman Catholic countries, as an essential part of the religious celebration of matrimony. It is not necessary to the validity of marriage, however, which, in England and the United States at least, could always be effected by a civil contract without ceremony. The object of this publication was to give notoriety to the act, so that all who had valid objections to the marriage might be enabled to state them in time. By the English Book of Common Prayer the announcement is required to be made in the terms of the rubric prefixed to the marriage service, on three Sundays preceding the ceremony. If any valid objections are offered, it is the duty of the clergyman to proceed no further with the marriage; if, notwithstanding, he marries the parties, he will be liable to severe penalties by the ecclesiastical law, though it does not subject him to the ordinary criminal law of the land. According to the old English Canon Law the publication of banns might be made on holy days; but a change was made to Sunday by the first important English Marriage Act, the 26 Geo. II, c. 33—a provision which is still in force.

The custom was continued in the early history of the English Colonies in America and of the States formed from them. It is now practically obsolete in the United States, except in the Roman Catholic church, although it is still recognized in the statutes of some of the States (Stimson, *American Statute Law*, sec. 6120). See MARRIAGE, and consult the authorities there referred to.

**BANQUETTE,** băn-ket' (Fr. dimin. of *banc*, bench). A projection or raised ledge forming a platform on the inner side of the parapet of a rampart and designed to accommodate and protect the rifle fire of the defenders. Its dimensions vary according to circumstances. See FORTIFICATION.

**BANQUO,** băn'kwō. According to Holinshed, who probably drew his information from Boece, a Scottish warrior of the eleventh century and the progenitor of the royal house of Stuart. In 1066 he is said to have joined Macbeth in a conspiracy against King Duncan and to have been treacherously slain by his confederate. Shakespeare does not mention him as a conspirator, but only as Macbeth's victim. Boswell-Stone (*Shakespeare's Holinshed*, New York, 1896) says "Banquo and Fleance were, I suppose, creatures of Boece's imagination."

**BAN'SHEE, or BEN'SHEE** (Gael. *ban-sìth*; from *ban*, woman + *sith*, Ir. *sighe*, fairy). An imaginary being in Irish and general Celtic folklore. The banshee is a female, called the wife of the fairies, who makes her presence known by wailings and shrieks, and thus gives warning of a death in the family, over which she is presumed to exercise a kind of guardianship. Not all Celtic families, however, enjoy this guardianship, which seems to be reserved for certain exclusive lines of descent.

**BANSWARA,** bân-swä'rà. A native state of Rajputana, India, in the west of Malwa, bordering on Gujerat (Map: India, B 4). It extends from lat. 23° 10' to 23° 48' N., and from long. 74° 2' to °74 41' E. Area, 1606 square miles. Pop., 1891, 181,000; 1901, 165,300; 1911, 165,463.

**BANTAM,** băn-tăm' *or* băn'tam. A seaport town in the western part of Java, situated in the residency of the same name on Bantam Bay (Map: East Indies, C 6). It was the capital of the kingdom of Bantam, which was a powerful state before the Dutch conquest. The town attained considerable commercial importance during the sixteenth and seventeenth centuries. Since the foundation of Batavia, Bantam has steadily declined, and only ruins of its former greatness remain.

**BANTAM.** A class of diminutive domestic fowls. See FOWL.

**BANTAYAN,** bän-tä'yän. A town on the island of the same name, belonging to the province of Cebu, Philippine Islands, situated 62 miles north of Cebu. Numerous shoals make navigation difficult. A leper colony inhabits a small island just off shore. Pop., 1903, 13,324.

**BAN'TENG** (native Malay name). An East Indian ox (*Bos sondaicus*), which inhabits southern Burma and the Malay Peninsula, Borneo, and Java, is by some considered only a local race of the gaur of India. It is smaller and of lighter build than the gaur, with a longer and sharper head, and the horns more slender and rounded; there is less of a dorsal ridge, and the cow is peculiar in being bright dun in color, while the bulls more nearly resemble gaurs. This wild ox inhabits the jungle and is exceedingly wary and pugnacious. It has been interbred with the zebu and other domestic cattle, yielding a serviceable hybrid, of which large herds are kept by the Malays of Java and Bali. Consult Wallace, *Malay Archipelago* (New York, 1869). See Plate of WILD CATTLE, under CATTLE.

**BANT'ING SYS'TEM.** See OBESITY.

**BAN'TOCK,** GRANVILLE (1868– ). An English composer and conductor. He was born in London, Aug. 7, 1868, and educated originally for the East India service. But his love of music caused him to change his plans. After a brief preparatory course under Dr. Saunders he entered the Royal Academy of Music in 1889, and there won the Macfarren Prize in his first year. From 1893 to 1896 he edited *The New Quarterly Musical Review.* He began his career as conductor in 1896, when he accepted a position with G. Edwardes's opera company. Concerts given by him in London in 1897 attracted attention from the fact that he brought out nothing but English compositions of the most recent date. In the same year he was appointed municipal director of music at New Brighton, where he established an orchestra and a choral society, which soon rose to a high level of excellence. In 1900 he became principal of the Birmingham and Midland Music School and in 1903 he added to educational duties those of conductor of the Liverpool Orchestral Association. In 1908 he became professor of music in Birmingham University. Bantock became known not only as one of the most energetic champions of modern English music, but also as one of the most prolific and distinguished composers of the day. After 1900 scarcely a year passed that a new work from his pen was not heard at one of the great English festivals. His principal works are the operas: *Cadmar* (1892), *The Pearl of Iran* (1896), and incidental music to his own five-act drama *Rameses II* (1891); an oratorio, *Christ in the Wilderness* (1907); the symphonic poems: *Thalaba* (1900), *Dante* (1902), *Fifine at the Fair* (1902), *The Witch of Atlas* (1902), *Lalla Rookh* (1903), *Dante and Beatrice* (1911); the overtures: *The Fire Worshippers* (1892), *Eugene Aram* (1895), *Saul* (1907), *Overture to a Greek Tragedy* (1911); vocal works with orchestra: *Wulstan* (1892), *Thorvenda's Dream* (1903), *The Spirit of the Times* (1904), *Sea-Wanderers* (1905), *Omar Khayyam* (two parts, 1906 and 1907); a choral symphony, *Atalanta in Calydon* (1912); and an *a Cappella* mass in B flat for male voices, male and mixed choruses; several smaller compositions for orchestra; a string quartet in C minor; Serenade for four horns; piano works and songs.

**BAN'TRY** (Ir. *Beantraighe,* descendants of Beann, of the royal race of Ulster). A seaport town and famous summer resort in the southwest of county Cork, Ireland, 44 miles west-northwest of Cork (Map: Ireland, B 5). It is at the head of Bantry Bay (q.v.), where in 1796 a French fleet anchored and an abortive attempt was made to land. The chief trade is the export of agricultural produce. Pop., 1901, 3109; 1911, 3159.

**BANTRY BAY.** An inlet of county Cork, in the southwest extremity of Ireland (Map: Ireland, B 5). It runs east-northeast, is 25 miles long, from 3 to 5 miles wide, affords safe anchorage for the largest ocean-going vessels, and is a naval rendezvous. The lighthouse on Ronacarrig Island at the east entrance of the bay has a fixed light which is visible 10 miles at sea. Consult Palliser, "Bantry Bay," in *United Service Magazine,* vol. xviii (London, 1898).

**BANTU,** bän'tōō (*Ba-ntu,* the people). A group of negroes of Central and South Africa, forming Class VI of Deniker (see AFRICA), in which they are divided into western, eastern, and southern. One language unites this people, which otherwise shows considerable diversity. More particularly, it is necessary to emphasize the fact that they do not constitute a single physical or racial type. They are capable and progressive, and great colonizers. With the exception of the Herero, who must be supposed to have lost the art, all the Bantu are tillers of the soil, the women everywhere attending to cultivation, while the men hunt and in many regions herd the stock. Maize has been introduced and has become the staple food in many territories, where the banana probably at one time held a similar position, as it still does in Uganda. In some districts millet is the most important food. A knowledge of smelting iron is shared by all the Bantu. Their clothing varies, including skin coverings, bark cloth, and loom-woven fabrics. Such arts as pottery, carving, and basketry flourish over wide areas. In a number of instances great nations have been founded by some conquering prince of exceptional ability, and in such cases there is a wonderful development of court offices and titles of nobility, recalling mediæval feudal conditions. However, these monarchies are rarely of long duration; with the decease of the founder they generally degenerate and are split up into smaller territories. For other cultural traits, such as religion, see AFRICA, *Ethnology.* The principal subdivisions of the Bantu are the following: Bakalai, Bakuba, Baluba, Balunda, Basuto, Bateke, Bechuanas, Bongo, Congo, Dualla, Fans, Herero, Lunda, Mpongwe, Nyoro, Ovampo, Rua, Sechuana, Swahili, and Zulu. Consult Deniker, *Races of Man* (London, 1900). On the languages Professor Meinhof is the leading authority.

**BANUS.** See BAN.

**BANVILLE,** bän'vēl', THÉODORE FAULLAIN DE (1823–91). A French poet, born at Moulins. A pupil of Hugo in prosody and rhetoric, he was a follower of Gautier in his passionless objectivity and hedonistic ethics. The titles of his volumes of poetry suggest the impassive nature of the contents: *Cariatides* (1842); *Stalactites* (1846); *Odelettes* (1856); *Odes funambulesques* (1857); and *Nouvelles odes funambulesques* (1869). The Franco-German War stirred him to a more passionate utterance in *Idylles prus-*

*siennes* (1871). He wrote also two charming dramatic sketches, *Gringoire* (1866), a sort of defense of poetry against the materialistic spirit of the Napoleonic régime, and *Socrate et sa femme* (1885). His prose pieces are poetry in all but form, whether they call themselves 'Fairy Tales' (*Contes féeriques*) or 'Parisian Sketches' (*Esquisses parisiennes*, 1859). His critical *Traité de la poésie française* (1872) won him the title of "Legislator of Parnassus." But it is as a poet alone that he survives—a poet of a disillusioned age, a product of the determinist philosophy of Taine and the cynical materialism of the Empire. In form, as in ethics, he is a sensualist, reviving the artificial stanzas of the fourteenth century and in this becoming a forerunner of Austin Dobson (q.v.). In his *Odes funambulesques* his muse dances on the wire that he has stretched for her, with an easy assurance that evokes an amused admiration. It is the perfection of fanciful frivolity, inexhaustible in the flow of its empty gayety, "with the one idea of expressing no idea" (Lemaître), but producing the desired impression by artful interlinking of rhymes and harmonious or peculiar succession of sounds. Banville had a marvelous gift of musical speech that sings itself into the ear with a strange melody, or provokes a cynic laugh by its metallic iteration. Such art of poetry is ill-adapted to serious subjects. It closes its eyes deliberately to the sterner half of life and finds its natural element in pagan myths, renascent ideals, and Bohemian manners. Of such subjects he will paint exquisite pictures, cameos whose clear-cut outlines rival the brilliancy of their color. He is the most ingrained pagan among modern French poets. Banville's *Œuvres* are published in 8 vols. (1873–78), with a posthumous volume *Dernières poésies* (1893). His *Ballades* were translated into English verse by A. T. Strong (London, 1913). He died in Paris, March 13, 1891. Consult: Dowden, *A History of French Literature* (1897); Pellissier, *Le mouvement littéraire au XIXème siècle* (1901); the works on French literature by Faguet, Doumic, Lanson, Brunetière, Tellier, Wells (1896), and the bibliography appended to the article FRENCH LITERATURE.

**BANXRING,** bănks'rĭng. A Javan tree shrew. See TREE SHREW.

**BANYAN,** băn'yan (Hind. *banya*, Beng. *baniya*, Skt. *vanij*, merchant, as the tree is used by native merchants as a market place), also spelled BANIAN, *Ficus benghalensis*. A tree, native of India, growing to a height of 70 to 100 feet, remarkable for its vast prop roots. The banyan tree is extensively planted, but occurs in a wild state only in the lower Himalayas and the Deccan Hills. It is a species of fig (q.v.); has ovate, heart-shaped entire leaves, about 5 or 6 inches long; and produces a fruit of a rich scarlet color, not larger than a cherry, growing in pairs from the axils of the leaves. The branches send roots downward, which, when they have rooted, become props, the tree in this manner spreading over a great surface and enduring for many ages. A famous banyan tree exists in the Botanic Garden at Calcutta, India. This tree is known to be about a century old. Its main trunk is 40 feet in circumference, and there are 230 prop roots 6 to 10 feet in circumference. One has been described as having no fewer than 350 prop roots, equal to large oaks, and more than 3000 smaller ones, covering a space sufficient to contain 7000 persons. The vegetation of the banyan seldom begins on the ground. The seeds are deposited by birds in the crowns of palms and send down roots which embrace and eventually kill the palm. As the banyan gets old, it breaks up into separate masses, the original trunk decaying, and the props becoming separate trunks of the different portions. The wood of the banyan is light, porous, and of no value. The bark is regarded by the Hindu physicians as a powerful tonic and is administered in diabetes. The white glutinous juice is used to relieve toothache, and as an application to the soles of the feet when inflamed. Birdlime is also made from it. Gum lac is obtained in abundance from the banyan tree. The banyan tree is beautifully described by Southey in his poem, "The Curse of Kehama." The banyan has been successfully conveyed to other lands, fine specimens being reported in Honolulu and elsewhere. The name "banyan tree" is often improperly applied to *Ficus indica*, a somewhat smaller tree. See Plate of BAMBOO, BALSAM, ETC.

**BANYULS-SUR-MER,** bȧ'nyul'-sur-mâr' (Fr. little baths on the sea). A fishing port and summer resort on the Mediterranean, in the department of Pyrénées Orientales, France. It exports honey, oranges, and cork, and the famous Roussillon, Guenache, and Ranio wines, which are made in the neighborhood. Pop., 1901, 3111; 1906, 3301; 1911, 3216.

**BANYUMAS,** băn'yōō-mäs', or **BANJOEMAS** (golden water). A residency and a town of Java, situated on the south coast of the island (Map: East Indies, C 6). Area of residency, 2146 square miles. Its population was 1,251,963 in 1900, including about 1000 Europeans and about 5000 Chinese. The town and seat of the resident is situated on the river Serajo, about 22 miles inland. It has a considerable trade and contains a population of about 6500.

**BANYUWANGY.** See BANJUWANGY.

**BANZ,** bänts (Goth. *bansts*, inclosure). A castle, belonging to one of the Bavarian princes, originally a Benedictine abbey, in Upper Franconia, Bavaria, near Lichtenfels, on the Main; situated on a mountain slope over 1400 feet high. The abbey was founded in the eleventh century and celebrated for the superior culture of its monks. During the Peasants' War in the sixteenth century the abbey was destroyed but immediately restored, again destroyed in the Thirty Years' War, and again restored. In 1802 is was broken up, the books and collections were scattered among German institutions, and the building turned to its present use. The castle contains a number of beautiful rooms, and also a very rare and valuable collection of petrified objects.

**BAOBAB** (bā'ō-băb) **TREE.** See ADANSONIA.

**BAOUR-LORMIAN,** bȧ'ōōr'lôr'myăN', PIERRE MARIE FRANÇOIS LOUIS (1770–1854). A French poet and dramatic author, born at Toulouse. His plays were much praised at the time of their performance, and his translations of *Tasso* (1795) and *Ossian* (1801) attracted the favor of Napoleon. In 1815 he was made a member of the Academy; but the reign of the classic style was over, and protesting to the end with feeble dialogues, *Le classique et le romantique, encore un mot*, the poet found himself the butt of epigrams. Upon his death, however, the Academy paid him extraordinary honors.

**BAPAUME,** bȧ'-pōm'. The chief town of a

canton, in the department of Pas-de-Calais, France (Map: France, N., H 2). Pop., 1901, 3013; 1906, 2946; 1911, 2917. In August, 1793, a detachment of the allied troops advanced to this place, after compelling the French to abandon their fortified position and to retreat behind the Scarpe. The town was also the scene of one of the severest and most closely contested battles of the Franco-German War. It was fought Jan. 3, 1871, both sides claiming the victory. The Germans, however, were compelled to retreat beyond the Somme.

**BAPH'OMET.** The name of a mysterious symbol which was alleged to be in use among the Templars. According to the oldest and most probable interpretation, the word is a corruption of Mahomet, to whose faith the members of the order were accused of having a leaning. Indeed, the Old Spanish form is *Mafomat*. The symbol consisted of a small human figure cut out of stone, having two heads, male and female, with the rest of the body purely feminine. It was environed with serpents and astronomical attributes and furnished with inscriptions, for the most part in Arabic. Specimens are to be found in the archæological collections of Vienna and Weimar and elsewhere. Joseph von Hammer-Purgstall, however, in the *Fundgruben des Orients* (Vienna, 1818), derives Baphomet from Gk. *βαφή, baphē*, baptism; and *μῆτις, mētis*, council or wisdom. He charges the knights with depraved Gnosticism and makes the word signify the baptism of wisdom. But this explanation is generally discredited. Other explanations even less probable are offered.

**BAPTAN'ODON** (Gk. *βάπτειν, baptein*, to dip, here referring to amphibian habits + *ἀν, an*, priv. + *ὀδούς, odous*, tooth). The only American representative of the aquatic ichthyopterygian reptiles, and a late development of the Ichthyosaurus race. The animal was fish-like in general appearance, like all the Ichthyosaurians, and was provided with paddles that were shorter and broader than those of the other members of the group. The jaws were without teeth, and this leads to the supposition that the animal fed upon the succulent plants that grew in the vicinity of its dwelling place. It was about 10 feet long, and it lived during Middle Jurassic times in the shallow marine waters of the Colorado-Wyoming Basin. The name "Baptanodon beds," given by Professor Marsh to the series of rocks containing this fossil, has recently been replaced by "Shirley Formation." See ICHTHYOSAURUS.

**BAP'TISM** (OF. *baptesme*, Gk. *βάπτισμα, baptisma*, from *βαπτίζειν, baptizein*, to dip). One of the sacraments of the Christian Church, performed by applying water to the person of the candidate in various modes, in the name of the Trinity. Its institution is referred by the Gospels to Christ himself (Matt. xxviii. 19; Mark xvi. 16). Modern criticism has sometimes questioned the correctness of this reference, upon the ground that Christ did not concern himself with outward institutions; but there is no objective warrant for this rejection of the texts, and the immediate observance of baptism upon the beginning of the Church at Pentecost implies previous and well-understood establishment of the rite. The name and the rite were not, however, altogether new when the ordinance was instituted by Christ. The Jewish law introduced the custom of washing or baptizing proselytes upon their admission into the Jewish church. John the Baptist baptized, not proselytes upon their renouncing heathenism, but those who by birth and descent were already members of the Jewish church, to indicate the necessity of a purification of the soul from sin—a spiritual and not a mere outward change. There has long been much controversy as to the proper subjects of baptism—whether adults only are to be baptized upon confession of their faith in Christ, or whether their infants are also to receive the ordinance. (See BAPTISTS; BAPTISM, INFANT.) The general practice of the Church, Greek, Roman, and Reformed, has been to baptize infants. Another controversy of long standing has been that as to the mode of baptism—whether immersion alone constitutes valid baptism, or whether other forms may be used. Those who favor immersion argue from the meaning of the word "baptize," from New Testament usage, from the symbolism of the doctrine, which they think has reference to the death, burial, and resurrection of Christ (Rom. vi. 3, 4), and from the acknowledged custom of the ancient and Oriental Church. Their opponents deny that the word "baptize" is exactly and solely equivalent in the New Testament to the word "immerse," dispute the definiteness of the testimony to the forms there referred to, restrict the symbolism to that of cleansing, and deny the whole cogency of the argument that apostolic example is, and was intended to be, binding upon the Church in purely formal matters. See BAPTISTS.

In the primitive Church the ordinary mode of baptism was by immersion, for which purpose *baptisteries* (see BAPTISTERY) began to be erected in the third, perhaps in the second century, and the sexes were usually baptized apart. But baptism was administered to sick persons by sprinkling; although doubts as to the complete efficacy of this *clinic* (sick) baptism were evidently prevalent in the time of Cyprian (middle of the third century). Baptism by sprinkling gradually became more prevalent; but the dispute concerning the mode of baptism became one of the irreconcilable differences between the Eastern and Western churches—the former generally adhering to the practice of immersion, whilst the latter adopted mere pouring of water on the head or sprinkling on the face, which practice has generally prevailed since the thirteenth century, but not universally, for it was the ordinary practice in England before the Reformation to immerse infants, and the *fonts* (see FONT) in the churches were made large enough for this purpose. This continued also to be the practice till the reign of Elizabeth; and the change which then took place is ascribed to the English divines who had sought refuge in Geneva, and other places on the Continent, during the reign of Mary. To this day the rubric of the Church of England requires, that if the godfathers and godmothers "shall certify him that the child may well endure it," the officiating priest "shall dip it in the water discreetly and warily"; and it is only "if they shall certify that the child is weak," that "it shall suffice to pour water upon it," which, however, or sprinkling, is now the ordinary practice.

Baptism was accompanied, from an early period in the history of the Church, with various forms and ceremonies, besides the simple rite of washing with water, and the pronouncing of the formula which declares it to be "in the name of the Father, and of the Son, and of the Holy

Ghost." These ceremonies are almost all retained in the Church of Rome, and also generally in the Oriental churches, but have been generally or almost entirely laid aside by Protestants. The Church of England retains the sign of the Cross made upon the forehead after baptism, but most of the other Protestant churches reject it. It was an ancient custom that the *catechumens*, as candidates for baptism were called while receiving instruction with a view to that sacrament, when they were to be baptized, publicly made a profession of their faith and a renunciation of the devil and all his works. The profession of faith is still retained by Protestant churches as the formal ground of the administration of baptism; the renunciation of the devil and his works is required by the Church of England of the person baptized, if an adult, or of the *sponsors* (q.v.) or "sureties" of a child. Sponsors were early admitted to answer for those who could not answer for themselves, and particularly for infants. The belief in the absolute necessity of baptism to salvation led even to baptism of the dead among the Montanists in Africa, in which sponsorship was also introduced. Presbyterian and Independent churches generally reject all sponsorship, and regard the profession made by parents as simply a profession of their own faith, which entitles their infants to baptism. The ancient practice of exorcism (q.v.) immediately before baptism has been rejected as superstitious by almost all Protestant churches; as have also that of immersing three times (*trine immersion*), or sprinkling three times, with reference to the three persons of the Godhead; that of breathing upon the baptized person, to signify the expulsion of the devil and to symbolize the gift of the Holy Spirit; that of anointing with oil (*chrism*, q.v.) to symbolize the same gift, or to indicate that the baptized person is ready, as a wrestler in the ancient games, to fight the good fight of faith; that of giving him milk and honey, in token of his spiritual youth and of his reception of spiritual gifts and graces; that of putting a little salt into his mouth, to signify the wisdom and taste for heavenly things proper to a Christian; that of touching his nostrils and ears with spittle, to signify that his ears are to be ever open to truth, and that he should ever feel the sweet odor of truth and virtue; and that of clothing him after baptism with a white robe (the *chrysome*), in token of the innocence of soul which by baptism he was supposed to have acquired. The white robe and the anointing with oil were retained in the Church of England for a short time after the Reformation. The giving of a name in baptism, however, is no essential part of the rite, but is a custom apparently derived from that of the Jews in circumcision (Luke i. 59–63). The Church of Rome prefers the use of holy water (q.v.) in baptism, but regards any water as fit for the purpose in case of necessity. Whether baptism may be administered in private has been much debated, both in ancient and modern times. The administration of baptism in private houses, and not in the presence of a congregation, was objected to by the Presbyterians in Scotland, and is discouraged, even while it is allowed, if there is "great cause and necessity," by the Church of England; yet it has become very frequent both in the Church of England and among the Presbyterians of Scotland, and also is not uncommon in the United States.

Although the administration of baptism is properly restricted, under ordinary circumstances, to the regular ministry of the Church, even the most rigid sacerdotal communions, like the Roman Catholic, have always held that in cases of necessity it might be administered by any one—a woman or an unbeliever. The reason of this apparent laxity is the belief in the necessity of the ordinance to salvation. Protestant churches, which do not hold this belief, generally insist upon the participation of the ordained ministry in the ceremony. But all Christians now generally hold the validity of any baptism which is seriously done in the name of the Holy Trinity.

The effect of baptism is taught by the Roman Catholic church to consist in the forgiveness of all sins before baptism and the removal of the guilt of original sin. (See SACRAMENT.) Some Protestant churches teach, or favor, this doctrine of baptismal regeneration. (See REGENERATION.) But the great body of the Reformed Protestant churches teach that baptism is a sign of the necessity of regenerating grace, a pledge upon the part of God to forgive the sins of the penitent, and an act of consecration and dedication upon the part of parents, and of profession of faith on the part of adults. It thus is the sign of something effected rather than the instrument for effecting anything.

Consult: Allen, *Christian Institution* (New York, 1897); article "Baptism," *Encyclopædia of Religion and Ethics* (New York, 1908–11); Harnack, *History of Dogma* (Boston, 1901); Dale, *Classic Baptism* (Philadelphia, 1867), *Judaic Baptism* (1871), *Christic and Patristic Baptism* (1874), and the reply, D. B. Ford, *Studies on the Baptism Question* (Boston, 1879); Hall, *The Services for Holy Baptism, Confirmation and Holy Communion* (London, 1909); Wilkinson, *Baptism, What Saith the Scripture?* 3d ed. (London, 1907).

**BAPTISM, INFANT.** The New Testament is silent upon this subject. The biblical argument in its favor is confessedly inferential. It is based on the fact that the Old Testament covenant included children with their parents, and infers that the New Testament covenant does the same, and that baptism takes the place of circumcision as the covenant seal. Equally inferential is the argument against it. This starts from the proposition that baptism is a profession of faith (Acts ii. 38), and, since faith is impossible to infants, denies the appropriateness of their baptism. Irenæus in the early Church gives explicit testimony to infant baptism, as does a letter of St. Cyprian and 64 bishops in council assembled. By the time of Tertullian it was evidently in general use.

The development of infant baptism in the Church is closely connected with the development of the idea of the necessity of baptism to salvation. The second century generally ascribed three effects to baptism: forgiveness of all previous sins, communication of the Holy Spirit, and the impartation of a living power carrying immortality with it. The tendency was to ascribe this efficiency to the baptism as an external transaction. Faith was not forgotten, but was left unadjusted to this really inconsistent premise. Hence the argument went unhindered forward to the assertion of baptismal regeneration. But if regeneration was effected by baptism, baptism is necessary to salvation. And hence infants, so many of whom die in infancy, must be baptized if they are to be saved. The entire

Christian Church was soon united upon this reasoning.

Two tendencies were soon marked. The Greek church emphasized more the effect of baptism upon the future, the impartation to the child of the gift of immortality, and the implanting in him of spiritual power. The Latin church looked back rather upon the past, and hence baptism was held to effect the forgiveness of original sin.

The turning point in the history of the subject was made by the teachings of Augustine. While there are two distinct periods in his doctrine, he is steadily more and more influenced by his doctrine of the Church. Membership in the visible Church is viewed by him as necessary to the reception of grace and so to salvation. Therefore baptism, as the door of the Church, is necessary to salvation. It is the sacrament of regeneration. At first Augustine taught that only actual sins were forgiven in baptism, but later he said that the guilt of original sin was also forgiven. Conversion, however, is necessary as well as baptism, and in his earlier treatises there is a degree of liberality in asserting the saving power of the former where the latter was involuntarily omitted. Later the necessity of baptism was more uncompromisingly asserted. Children must therefore be baptized, and in their case regeneration is wrought in baptism by the faith of the whole Church. While unbaptized children do not gain eternal bliss, they suffer no punishment.

At the Reformation the effort was made to extricate the doctrine from the externalism which had become fixed and intensified in the Roman church and to give a due place to the idea of faith. Luther held that faith was wrought in children; Melanchthon, that faith must come later to perfect the sacrament. The Anabaptists, who sought the most radical reform of the Church upon the basis of the New Testament alone, rejected infant baptism as not mentioned in Scripture and inconsistent with the requirement of faith. The same view of the subject arose among the radical element of the English Reformation, the Congregationalists, who divided in Holland upon this issue. Some of them, returning in 1611, formed the first Baptist church in London. (See BAPTISTS.) The large extension of the Baptists in the United States and their constant exposition of their position against infant baptism has led to a considerable neglect of it in denominations that still maintain and generally practice it. The necessity of baptism to salvation is now maintained only by the Roman Catholic church and by the sacramentarian party of the Lutheran and English churches.

Consult the books mentioned under BAPTISM, and the classical work W. Wall, *History of Infant Baptism* (new ed., 2 vols., Oxford, 1862); White, *Why Infants are Baptized* (Philadelphia).

**BAPTISM BY HERETICS.** See HERETIC BAPTISM.

**BAPTIST.** See JOHN THE BAPTIST.

**BAPTIST CHURCH OF CHRIST.** See BAPTISTS.

**BAP'TISTERY** (Gk. *βαπτιστήριον, baptistērion*, bathing place). A place where baptism is administered. A term used to designate a separate building, or the annex or part of the church used for that purpose, or even the baptismal font. In the Apostolic Age, it is true, converts were usually baptized in the nearest running water, and this remained permissible for a long time—as in Charlemagne's wholesale baptism of the Saxons and in most early missionary work. But as early as the second century Christian ritual required a separate building, provided with a basin or tank for immersion, and attached to an episcopal church, for baptism was connected with the abjuration of error and the hearing of mass. Baptisteries were of a well-defined form; their prototypes are the *frigidarium* in some of the smaller and private Roman baths, as at Pompeii and Stabiæ, which were circular rooms with a *piscina* or *baptisterium* in the centre; this central tank, also called *piscina* by Christian writers, was usually octagonal in form in the baptisteries and entered by a descent of several steps (usually three) from the floor level. The earliest baptisteries preserved are in the Roman Catacombs (q.v.), supplied by natural springs, and these were used during the persecutions; the best known is that of the Catacomb of Pontianus (third century). In the fourth century, beginning with Constantine, many large baptisteries were erected. As they were not allowed except in connection with a cathedral church, and as the rite of baptism was administered ordinarily only at certain seasons—Easter, Pentecost, and Epiphany—the baptisteries had to be so large that several thousand persons might be baptized on each occasion. These baptisteries, usually circular or polygonal in plan, rarely cruciform, were placed close to the church and connected with it, sometimes in front of the atrium, either on its central axis (Parenzo), or to one side (Torcello). The main hall, with the *piscina* or *fons* in its centre, was usually preceded by a closed *portico* (Aquileia, Lateran), where the ceremony of the Confession of Faith took place, and contained an altar, often placed in a special apse, for services to follow the baptism. The baptistery was, therefore, a church. It was commonly dedicated to St. John the Baptist. The baptismal basin itself was surrounded by columns, between which hangings were drawn which concealed from the crowd the actual scene of baptism. Above this central section usually rose a dome of masonry or wood, while around it was often an encircling aisle—sometimes two aisles—to accommodate the crowd. Early writers describe the magnificent decorations and furnishings of the baptisteries. That of St. John Lateran is said to be by Constantine, and is certainly not much later. It is an octagon, with an interior 69 feet wide, divided by eight columns into a centre and an ambulatory which is unique in being surmounted by a gallery. But in more unchanged condition is the contemporary (c.420) baptistery of the cathedral of Ravenna, an octagon inscribed in a square, whose walls and dome are completely covered with a wonderful decoration of mosaics, stuccoes, and marble slabs—one of the most perfect specimens of Early Christian art. Somewhat later the Arian heretics built a smaller baptistery for themselves (c.500) in Ravenna, on a similar plan. Several ruined baptisteries have been found connected with the interesting churches of the ruined cities of Syria, all of them of the fourth, fifth, and sixth centuries. That at Kalat-Seman is unique, not only in its four porticoes and four chambers symmetrically grouped around it, but in being set beside a small baptismal church, of basilical form. Of circular baptisteries, the most important is that at Nocera (fifth century) in southern Italy, measuring 70 feet inner diameter, with a peculiar brick dome supported on 15 pairs of coupled columns and surrounded by a vaulted aisle. The *piscina* at Nocera is unusually well preserved;

it is 20 feet wide and 5 feet deep, with two descending steps, a parapet with marble slabs, and eight surrounding columns for the hangings. The church of Santa Costanza, in Rome, similar to this and by many still regarded as a baptistery, was really the mausoleum of Constantia, the daughter of Constantine. Other interesting early examples are at Aquileia, Derseta and Moudjeleia in Syria, Albenga, Gravedona, and Sant' Aquilino, at Milan. Italy and the Orient alone have such early examples; among them the sixth-century baptistery of Hagia Sophia (St. Sophia) at Constantinople is still extant as an adjunct of the mosque. The period of decline from the seventh to the tenth centuries shows few of any importance. France has two examples at Fréjus and Poitiers. In the eleventh century the revival of architecture in Europe led to the building of superb baptisteries in Italy, but not elsewhere. Every free Italian commune had in its main square the group of three great religious structures—cathedral, tower, baptistery. The three most impressive of these groups are at Parma, Pisa, and Florence; others are at Pistoja, Novara, Cremona, Verona, Lucca, Volterra, and Siena. In the last named, the three are incorporated in one structure, the baptistery being set under the choir, owing to the steepness of the hill on which the cathedral stands. Its façade is one of the most perfect examples of Italian Gothic design. A superb Renaissance font rises from the centre of the octagonal base, which recalls the earlier piscina. Baptisteries of the mediæval period—eleventh, twelfth, and thirteenth centuries—are especially numerous in northern Italy; besides the above, there are others at Almenso, Casale, Monferrato, Bologna (San Stefano), Ascoli, Serravalle, Asti, and many more, while the south is represented only by Ruvo and Bari. Of all these baptisteries, that of Florence is the most noted for its internal decoration in mosaic and for its fine dome, its marble-figured pavement, and its wonderful bronze doors by Andrea Pisano and Ghiberti. That of Pisa contains Niccola Pisano's famous pulpit. The Parma baptistery is entirely filled with contemporary frescoes and sculptures. All three are exquisitely finished on the exterior with different colored marble incrustations, architectural details, and sculptures. In some cases the dome that surmounts the baptistery is allowed to show its outline on the exterior (Pisa); in other cases a straight wall is continued from the base of the dome to a height that entirely conceals it (Parma); or, as at Florence, to an intermediate height, to support a low pyramidal roof. The largest of these mediæval baptisteries far surpass the earlier examples in size and could hold large congregations. Besides such separate structures, there were cases where a part of the church itself was used for baptism, either in the form of a projecting chapel or of one forming a part of the regular plan. Such chapels were usually near the entrance, opening either on the narthex (q.v.) or on the interior. Such is the baptismal chapel opening out of the inner right-hand narthex at St. Mark's, Venice.

Before the Renaissance, however, the change in ritual from immersion to affusion and aspersion only made separate buildings unnecessary. The simpler rite could be performed in the church itself, and all that was required was a large holy-water vase. Renaissance artists executed many exquisite works of this sort during the fifteenth and sixteenth centuries. These works had been preceded by large sculptured immersion basins, as at San Frediano, Lucca, which had succeeded the simpler early tanks. In northern and western Europe no separate baptisteries seem to have been erected during the Middle Ages, except possibly in some of the French monasteries, though of these there are few if any traces extant. The general practice, even as early as the tenth century, was to set up a baptismal font in the north transept or in a chapel, and in England especially many of the mediæval fonts are still extant, often of great beauty. See BAPTISM; FONT; Plate of PISA.

**BAP'TISTS** (Gk. *βαπτίζειν, baptizein*, to dip in water, baptize). A name first given in 1644 to certain congregations of English Separatists, who had recently restored the ancient practice of immersion. These congregations were the first in modern times to maintain that immersion is essential to valid baptism; other bodies had practiced immersion, but without such teaching. The prominence assumed by the doctrine of baptism among the Baptists was due to the opposition of the other English churches to their practice. Immersion was denounced as new-fangled, unnecessary, immodest, dangerous to health, etc. Naturally Baptists retorted that immersion was indispensable. When the continental Anabaptists had practiced immersion, no one had opposed their practice vehemently, and they were not tempted therefore to give special emphasis to its necessity. In general characteristics of doctrine and polity the English Baptists were agreed with the more sober and evangelical groups of Anabaptists and with the Mennonites. They held that loyalty to Christ and His teachings is the supreme duty of Christians; that these teachings are contained in the Scriptures, which are thus the sole and authoritative rule of faith and practice; that the religion of Christ is spiritual, and none can enter the kingdom of heaven, or should enter the Church on earth, unless he has been born anew of the Spirit of God; that only those should be baptized, therefore, who make personal profession of faith in Christ and give credible evidence of regeneration; that a true Christian church is the fellowship of such baptized believers; that each church has Christ as sole Head and Lawgiver; that no secular power should interfere with the spiritual interests of any believer or of any church. These tenets are not accidentally associated, but constitute a logically compact series, each member of which is necessary to the full validity of the rest. All Baptist churches have been and are agreed in holding them, whatever their differences on other points.

From the first there were two main bodies among the English Baptists, distinguished by their adoption of the theology of Arminius or of Calvin. The Arminian or General Baptists originated first. About 1606 a congregation of Separatists at Gainsborough fled to Holland to escape persecution and established themselves at Amsterdam. Their leader, John Smyth, had been a clergyman of the Church of England; now his contact with the followers of Arminius and with the Mennonites led him to the adoption of many new opinions. He became convinced that infant baptism is not warranted by the Scriptures, and he therefore baptized himself, no doubt by affusion. Several of his followers joined him, and a new church was organized, practicing the baptism of believers only. Smyth soon withdrew from the church, but others held to their faith,

and, returning to England in 1611, established the first General Baptist church in London. By 1626 there were 5 such churches in England, and by 1644 they had increased to 47.

The Calvinistic or Particular Baptists sprang from a congregation of Separatists, established in London in 1616. In 1633 some members of this congregation, who opposed the baptism of infants, peaceably separated from the main body, a part of them receiving a new baptism; and soon afterward John Spilsbury became the pastor of this new congregation. In 1640 a further division in the original church occurred by mutual consent, and some of those composing one of the new congregations soon became convinced that immersion is the true scriptural baptism. Knowing none in England who practiced such baptism, they sent one of their number, Richard Blount, to Holland. There was at Rynsburg a Collegiant Church of Mennonites, who had adopted immersion in 1619 (probably having received it from the Polish Anabaptists, who had possibly derived their practice from some of the Swiss Anabaptists). Having been baptized by them, Blount returned to England, and began the administration of the new baptism in 1641. The Spilsbury people seem to have disliked this method, which they considered a vain search after a baptismal "succession," and about the same time adopted the practice of immersion *de novo*. As their pastor pithily remarked, "Where there is a beginning, some must be first." In 1644 seven churches of the Calvinistic order united in a Confession of Faith, being joined also by one French congregation, in which baptism was for the first time defined as "dipping" or "plunging." The General Baptist churches gradually adopted the same practice, though some of them continued the use of affusion as late as 1653.

During the period of the Civil War and the Commonwealth the Baptist churches received a practically full toleration and increased with great rapidity. This was especially true of the Particular Baptists, who were in closest sympathy with the Puritan movement. At the time of the Restoration (1660), the General Baptists claimed to have 20,000 members, whence it may be fairly estimated that there were fully 50,000 Baptists in all at that time. The services of these churches to the cause of English liberty, civil and religious, were heartily recognized. Several of Cromwell's highest officers were Baptists; some of the most popular preachers of the time were of the same faith; others, like John Milton, avowed Baptist sentiments, but never were connected with the churches. A few so far forgot their principles as to accept livings in the Established Church, and were even members of Cromwell's Triers, or commission of visitation for the setting in order of the parishes. The great majority, however, remained faithful to their contention, from the first, that the Church as a spiritual body should be entirely separate from the state, and that complete religious liberty should be given to all, even to Roman Catholics and Jews. It required two centuries for England to approximate the adoption of this Baptist programme. After the Restoration the Baptists were severely persecuted, the Conventicle and Five-Mile acts being strictly enforced against them. The well-known prolonged imprisonment of John Bunyan is the most conspicuous instance. Some proved more pliable than he and by promise of silence obtained their release; some, like Hanserd Knollys, were in prison many times; others, like William Kiffen, enjoyed the royal favor and escaped with comparative immunity. Under these persecutions the Baptists declined in numbers, and the Revolution (1688) found them greatly depleted and discouraged. The Act of Toleration secured them from further persecution, but for a whole century thereafter their progress was very slow. A convention of the Particular Baptists, held in 1689, and representing over 100 churches, published what remained for generations their recognized standard of doctrine and practice. It was in the main a readoption of the Westminster Confession and differed from the Confession of 1644 chiefly in being silent on the question of baptism (immersion) before communion. Until the great Wesleyan revival, in the middle part of the eighteenth century, there was no further progress among the English Baptists. Among the Particular churches a form of hyper-Calvinism was common, which prohibited more than the preaching of the law to the unconverted and discouraged all direct appeals to men to accept Christ as their Saviour. The result was paralysis to most churches, and death to not a few. Among the General Baptists Socinian views made rapid progress, and in the end a large part of their churches became Unitarian. The Wesleyan revival greatly affected the Baptist churches. A more evangelical type of preaching was revived in both wings of the denomination. Under the leadership of Dan Taylor, a converted miner, the New Connection of General Baptists was organized and became a flourishing and influential body. But the most important result of this new quickening of spiritual life was the undertaking of work in foreign missions, under the leadership of William Carey. The English Baptist Missionary Society was organized Oct. 2, 1792, and the following year Carey was able to begin his labors in India. At his death, in 1834, not only had many converts been made, but versions of the Scriptures had been issued under his supervision in 40 different dialects, spoken by one-third of the people in the world; and 212,000 copies of these versions had been printed. The great increase of the modern missionary cause is directly traceable to the work of Carey and the English Baptists. The reflex influence of this missionary enterprise upon the English Baptists themselves is equally remarkable. More than 100 new churches were organized in the last two decades of the eighteenth century—nearly equaling the increase of the entire century preceding this time—while in the first half of the nineteenth century 700 new churches were constituted. The most important step in the unification of the English Baptists was the formation of the Baptist Union in 1832. Into this all the various societies for missionary and educational purposes have been merged; and, finally, in 1891, the long-separated General and Particular Baptists became one body. Of the men whom these churches have produced during the last 100 years three stand forth preëminent: Andrew Fuller (1754–1815), Robert Hall (1764–1831), and Charles Haddon Spurgeon (1834–92).

The first Baptist church in Wales of which record remains was formed at or near Swansea in 1649. The growth of Baptists in that principality was greatly promoted by the labors of Vavasor Powell, who was baptized about 1655 and thereafter preached throughout the land, establishing 22 churches, some of which had

several hundred members. The progress of Baptist churches in Wales was steady but slow until 1800. Of the 855 Welsh churches now in existence, 640 were founded in the nineteenth century. Until lately these churches have belonged to the strict communion wing; in recent years some of the city and town churches have adopted "open" principles.

The first Baptist church in Scotland was founded in Caithness in 1750, but progress was very slow until Archibald McLean and the Haldane brothers began their work as evangelists—the first quarter of the last century. Scotland is naturally Presbyterian, and the growth of Baptist churches has been very slow—an average of 10 to the decade for the last 100 years. Ireland has also been an unpromising field. The oldest church dates from 1653. Two-thirds of the existing churches have been established since 1850.

**Baptists in America.** There were among the early colonists those who held Baptist views, but the first church established was at Providence, R. I. Roger Williams, a minister of the Church of England, but an advanced Puritan, on coming to the Colony of Massachusetts, became almost at once a disturbing element there, by his advocacy of notions that the authorities of that Colony were not disposed to tolerate. He was condemned to banishment, Oct. 8, 1635, and, to escape being deported to England, made his way through the wilderness in midwinter, bought land of the Narragansett Indians, and founded the Colony of Providence, on the principle of complete civil and religious liberty. His study of the Scriptures convinced him that only believers are fit subjects of baptism, and others of the little Colony had come by March, 1639, to hold similar opinions. No minister being within call, this little band of 12 believers decided to originate baptism; one of their number, Ezekiel Holliman, baptized Williams, and he baptized the rest. In the following year, probably, another Baptist church was formed in the neighboring Colony of Newport. A company of Welsh Baptists emigrated in 1665 and established themselves in the Colony of Massachusetts, settling after some vicissitudes at Rehoboth in 1667. A Baptist church was formed in Boston in 1655, and in spite of severe persecutions succeeded in maintaining itself there. Until 1691 the Baptists of Massachusetts experienced repeated and severe persecutions—fines and imprisonments and whippings—and it was not until 1833 that they ceased to be taxed for the support of a State church. Up to the Great Awakening (1750) there were but eight Baptist churches in this region.

A group of churches, established a little later than these in the New England region, became the most influential centre for the propagation of Baptist ideas. In 1688 a Baptist church was formed at Pennepek, or lower Dublin, now a part of Philadelphia, and in the same year another church was organized at Middletown, N. J. Twelve such churches were in existence by 1770. The constituent members of these churches were English and Welsh Baptists, of the Calvinistic wing, and the establishment of the Philadelphia Association in 1707 made them the most compact and influential body of Baptists in America. Most of the churches of New York Colony, as they were constituted from 1712 onward, sought admission to this association, which also contained members in Virginia and the Carolinas, as far south as Charleston. The adoption of a Confession before 1742, ever since known as the Philadelphia Confession, furnished a standard of doctrine that has endured to the present day and multiplied the influence of this association.

From these two centres the extension of Baptist churches slowly proceeded until the Great Awakening, when new life and vigor was infused into the movement, and the progress of Baptists in all the Colonies became relatively rapid. This progress was not seriously checked even by the Revolution, save in certain localities. There were probably no more than 10,000 members in the Baptist churches existing at the outbreak of that struggle; but a careful estimate made in 1792 (an enumeration, in large part) put the number of members at 35,000, and at the close of the century the Philadelphia Association stated the number at 100,000, distributed among 1200 churches. The great westward movement of the population after the Revolution was the opportunity of the Baptists, and they promptly improved it. The churches and associations on the borders of the new country sent missionary preachers into the new settlements, and gradually local societies were formed for this work. This led to the organization of State missionary conventions, and in 1832 to the formation of a national organization, the American Baptist Home Mission Society, which now sustains over 1500 workers at a cost of more than half a million dollars a year. In 1813 a society for foreign missions was formed, called "The General Convention of the Baptist Denomination in the United States," which continued to be the general agent of the churches for this work until 1845, when differences between the Northern and Southern churches concerning slavery produced a division. The Southern churches formed "The Southern Baptist Convention," with separate home and foreign missionary boards and Sunday-school board; while the Northern churches organized "The American Baptist Missionary Union." The American Baptist Publication Society began merely as a tract society in 1824, but since 1840 has become a great denominational publishing agency.

The most important event in the recent history of Baptists was the unification of three separate interests through the formation in 1907 of the Northern Baptist Convention, a strictly delegated body from the churches, which elects the officers and executive boards of the various societies, receives and acts upon their reports, and prepares a national budget of missionary operations, which is apportioned to the various States and by their conventions is apportioned to the churches. This increases both the control of the churches over their missionary operations, and their responsibility for the maintenance of the work.

The progress of American Baptists during the nineteenth century was very rapid, in spite of many controversies and schisms that divided their forces and lessened their numbers. The most serious of these schisms was that resulting in the establishment of the Disciples as a separate body, beginning about 1815 among the churches of western Pennsylvania and Ohio. This controversy extended throughout the region of the Central West and had disastrous effects. Less serious was the division among the Eastern and Southern churches from 1835 onward on the issue whether missionary societies, Sunday schools, and other similar agencies for Christian work are authorized by the Scriptures. The es-

tablishment of the Old School or Primitive Baptists was the result. The educational work of Baptists was begun in the academy at Hopewell, N. J., in 1756, and was suspended during the Revolution. The Philadelphia Association brought about the chartering of Brown University (as Rhode Island College) in 1764. Waterville (now Colby) College was founded in Maine in 1818, and a literary and theological institution (now Colgate University) at Hamilton, N. Y., in 1820. From this time on, colleges and seminaries multiplied, not infrequently in excess of denomination needs or ability to support them, until, in 1912, the Baptists had 10 theological schools, 97 schools of collegiate grade, and 91 academies, with property valued at over $82,000,000, of which nearly half is productive. See also NORTHERN BAPTISTS and SOUTHERN BAPTISTS.

**Baptist Theological Seminaries.** In the order of their foundation these are as follows: 1. Hamilton, established at Hamilton, N. Y., in 1820, by the Baptist Education Society of the State of New York, as "The Hamilton Literary and Theological Institution." In 1846 the literary department was chartered as Madison University (since 1889 Colgate), and in 1893 the university took control of the seminary. 2. Newton Theological Institution, established at Newton Centre, Mass., in 1825, by the Massachusetts Baptist Education Society. 3. Rochester, established at Rochester, N. Y., in 1850, by the New York Baptist Union for Ministerial Education. A German department was added in 1852. 4. Southern, established at Greenville, S. C., in 1859; interrupted by the Civil War, the sessions were resumed in 1865, and in 1877 it was removed to Louisville, Ky. 5. The Divinity School of the University of Chicago, established in Chicago in 1867 by the Baptist Theological Union for the Northwest, as the "Baptist Union Theological Seminary"; in 1877 removed to Morgan Park, and in 1890 returned to Chicago and consolidated with the new university. In 1873 a Scandinavian department was added. 6. Richmond, established in 1867 at Richmond, Va., by the American Baptist Home Ministry for the education of negro young men (now a part of Virginia Union University). 7. Crozer, established at Upland, Pa., in 1868, by the family of John P. Crozer. 8. Kansas City, established at Kansas City, Kans., in 1901. 9. Southwestern, established at Waco, Tex., in 1901 as a part of Baylor University, but since removed to Fort Worth, Tex. 10. Pacific Coast, established at Berkeley, Cal., in 1905.

**The Baptist Church in Other Countries.** The earliest Baptist churches in the *Canadian* provinces were formed of settlers from New England. A church was founded at Horton, Nova Scotia, in 1763; but this and many of the earlier churches were of mixed membership, composed equally of Baptists and Congregationalists. The preaching of Henry Alleine, an evangelist of great gifts, resulted in the founding of many churches from 1775 onward. Baptist preachers from Vermont began soon after the Revolution to make converts and form churches across the line; and in a similar way churches sprang up along the shore of Lake Ontario, in Upper Canada. A considerable number of Scottish immigrants settled in the Ottawa region, and the churches there trace their origin to the labors of the Haldane brothers. The first association was formed in 1800 by the churches of Nova Scotia and New Brunswick, and a missionary society was formed as early as 1815 in the same region. In 1846 the societies of this region were consolidated into "The Baptist Convention of the Maritime Provinces." In the other provinces a like consolidation was effected in 1888 by the formation of the "Baptist Convention of Ontario and Quebec." Five boards conduct the various branches of work that were formerly conducted by as many different societies. In proportion to their number and means Canadian Baptists have also been active in educational work. Acadia College was founded in 1838, and Woodstock College in 1857. Toronto Baptist College was founded in 1881, was affiliated with the University of Toronto in 1885, and was chartered as McMaster University in 1887, Moulton College, for young women, having been previously affiliated.

The Baptists in *France* owe their origin to a mission established in that country in 1832 by the Triennial Convention of American Baptists. Progress was slow for many years, owing to persecutions and other difficulties; but in later years growth has been steady and sure. The establishment of a theological school in 1879, by the aid of their American brethren, did much to promote the welfare of French Baptists, but it has proved impracticable to maintain it. For many years the work has been left wholly to native preachers.

The founder of the *German* Baptist churches, Johann Gerhard Oncken, had come by study of the Scriptures to such views of doctrine and practice as are everywhere held by Baptists, without any knowledge on his part that there were such people in existence. In 1834 he and six others were baptized at Hamburg by Rev. Barnas Sears, an American Baptist then pursuing studies in Germany, and so the first German Baptist church was established. In spite of severe persecutions the progress of this work was rapid almost from the first and has gone on with ever-accelerating momentum. A publishing house was started in 1828, and a theological school was opened in 1880; both have been and are flourishing institutions. In 1849 the associations previously existing were combined to form the "German Baptist Union," which, not content with fostering the work at home, has been an active missionary body. Germans have preached and gathered converts in Denmark, Finland, Poland, Holland, Switzerland, Russia, Hungary, Bulgaria, and Africa, until the numbers in these missionary churches equal those in Germany itself.

The work of Baptists was begun in *Sweden* by two sailors, natives of that country—Gustaf W. Schroeder, who was baptized in New York in 1844, and Frederick O. Nilsson, baptized at Hamburg by Oncken in 1847. Andreas Wiberg was a worthy third in this field. Opposition by the state church and repeated fines and imprisonments did not deter these preachers from carrying on their work, and the progress of the Baptist churches was rapid. The numerical results would be much larger but for the fact that a good proportion of the converts made have emigrated to the United States. A theological school established in 1866 has done much to further the work of the Swedish Baptists. From Sweden the work has extended into *Norway* also.

With one exception the Baptist churches of

*Africa* are of missionary origin. The Baptists of the Cape colonies owe their beginnings to English Baptist immigrants, and their earliest church was formed in 1820. For another half-century their progress was very slow; but the last two decades have seen a great advance, 18 of their 25 churches having been constituted since 1880. A missionary society sustains 4 mission stations among the natives, and a Baptist Union, formed in 1877, promotes the interests of all the churches. Mission work is carried on also by the American Baptist Missionary Union, the Baptist Missionary Society of England, the Southern Baptist Convention, and the German Baptists; and 125 churches have been established, with 14,786 members.

The Baptists in *Asia* are wholly of missionary origin. The oldest mission is that begun by Carey and the English Baptists in India proper, and since extended to Ceylon. The Australian Baptists have joined in this work, and have taken Eastern Bengal as their especial field. American and Canadian Baptists maintain missions in southern India, among the Telugu people. The oldest American mission, however, is that in Burma, and gradually the work has been extended to Assam, Siam, China, and Japan. The Southern Baptists have a mission also in western China. The Asiatic missions of the various Baptist societies have been the most fruitful in the history of modern missions.

The last century has produced considerable change in the doctrines and practices of Baptists, but most of these are such as they have shared with all other bodies. They are no longer rigid Calvinists, though the general type of theology is distinctly Calvinistic. Strict communion is yet the prevalent theory among them, but there is little enforcement of it in practice, except in the Southern States, though there is also little direct encouragement of "open" communion. Baptist churches have never had a heresy trial, and for more than 50 years a schism has been unknown among them. In polity they are Congregational.

Baptists began the twentieth century with over 5,000,000 communicants, including only what are sometimes called the "regular" Baptists. The membership in 1912 was distributed as follows: In the United States, 5,529,573; in Canada, 132,261; in the Latin-American countries, 11,113; in Great Britain, 416,377; in Europe, 166,310; in Asia, 163,278; in Africa, 10,176; in Australasia, 28,611. Altogether they number about 6,516,000. Increase during the years 1905–13 throughout the States was about 1,000,000.

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**Baptist Church of Christ.** A denomination that originated in Tennessee, where the oldest congregations were formed about 1808. They have spread to six other States, all of them in the South. Their belief is a modified Calvinism, which makes room for a general atonement; they practice feet-washing as a religious ordinance. The census report for 1906 gave them 93 churches and 6416 members.

**Baptists, Freewill,** correspond in doctrine and practice to the General Baptists of England, but originated in this country. There are two distinct bodies known by this name. The older arose in North Carolina and formed an association in 1729. Some of these afterward joined the regular Calvinistic churches of the region, and those who remained true to their first principles were popularly called "Freewillers." This nickname was finally accepted by them; but later, to distinguish themselves from others, they took the name "Original Freewill Baptists." They differ from the regular Baptist bodies mainly in practicing feet washing and anointing the sick with oil. In 1912 they had 834 churches and 57,231 members.

The better-known body arose in New Hampshire. Benjamin Randall, a convert of the Whitefield revival, was practically though not formally excluded from fellowship because he did not believe and preach the doctrine of election. A church believing in free grace was organized in New Durham, N. H., in 1780, and Randall was ordained to the ministry. The strength of the denomination has from the first been in New England, but it has made considerable progress in the Central West. In 1827 a general conference was formed, at first meeting biennially, but of late years triennially. In 1841 the Free Communion Baptists (a body that originated among the Separates, or churches that sprang up as a result of the Whitefield revivals) united with them. The Freewill Baptists bore emphatic testimony against slavery, especially in 1845, and declined overtures for union with certain Baptists of Kentucky, because the latter defended slavery. The Foreign Mission Society of the denomination was organized in 1833, and a home mission society in 1834. They sustain a college at Lewiston, Me.; Hillsdale College, Mich.; theological seminaries at Lewiston, Me., and Hillsdale, Mich., and several academies. The official name was changed some years ago to

Free Baptists, and the older name is going out of use. In 1906 the Free Baptists of the Maritime Provinces united with the other Baptists in a "United Baptist Convention." In 1910 the Free Baptists and regular Baptists of the United States arranged for the union and consolidation of their missionary societies, leaving further union to the local churches. The Free churches are still separately enumerated, to the number of 1110 in 1912, with 65,440 members. Consult Stewart, *History of the Freewill Baptists* (Dover, N. H., 1862); J. J. Butler, *Christian Theology* (1861).

**Baptists, Old School or Primitive,** also known as Anti-Mission, and popularly called "Hardshell." A denomination whose members claim to be the original Baptists, from whose principles and practices all others have departed. In fact, this body originated about 1835 in an organized opposition to missionary societies, Sunday schools, etc. This opposition really grew out of the hyper-Calvinistic theology held by some of the Baptist churches, and these human societies were held by them to make the salvation of men depend rather upon human effort than on divine grace. They do not believe in a paid or educated ministry and sustain no colleges or theological seminaries. They were at one time quite numerous in the Middle States, but are now strongest in the mountain districts of North Carolina, Tennessee, and Georgia. It is difficult to say whether they are increasing or diminishing, since adequate statistical information is not to be had. In 1912, according to the official reports, there were 2922 churches and 102,311 members.

**Baptists, Seventh-Day,** are distinguished from others mainly by their observance of the seventh day as the Christian day of worship. They hold that the literal observance of the Fourth Commandment has never lost its obligation. Their first church was founded in the Mill Yard, London, in 1676, by Rev. Francis Bampfield, a graduate of Oxford, and prebendary of Exeter Cathedral. This church still survives, but others founded in the seventeenth and eighteenth centuries have become extinct. The first American church was founded by Stephen Mumford, at Newport, R. I., in 1671. In this country they have increased steadily though not rapidly, and are active in propaganda. In 1842 they formed a foreign missionary society, and they support a tract and publishing house at Plainfield, N. J. They have a college at Alfred, N. Y., and another at Milton, Wis., besides a college at Salem, W. Va. For 1913 they report 83 churches and 8113 members, distributed through 24 States.

Consult C. F. Randolph, *Seventh-Day Baptists in Europe and America: A Series of Historical Papers* (2 vols., Plainfield, N. J., 1910), which in its wide scope includes a condensation of the findings of Sachse, whose books (Philadelphia, 1895–99) are the authoritative works on German Seventh-Day Baptists in America. See also the *Seventh-Day Baptist Year Book* (Plainfield, N. J., 1913) for statistics and other information regarding this denomination.

**Baptists, German Seventh-Day.** A body confined to Pennsylvania, where it originated. The first church was founded at Germantown in 1728 by Conrad Beissel and was an offshoot of the Dunkards. Under the leadership of the founder they established a colony at Ephrata, near Lancaster, where they lived a very austere community life. They spread to several of the adjacent counties, and there are now six congregations of this order. For the early history, see the *Chronicon Ephratense.*

**Baptists, Six-Principle,** originated as a separate body in 1690, when five London churches, dissatisfied with the Baptist Confession of the previous year, met and formed an assembly of their own, on the basis of the six principles enumerated in Heb. vi. 1–2: repentance, faith, baptism, laying on of hands, the resurrection of the dead, eternal life. In fact, they differed only on the question of laying hands immediately on all baptized persons. They were composed of both Calvinistic and Arminian Baptists, but the former withdrew after a time, and the remainder became absorbed into the General Baptists. Six-Principle Baptists existed in Rhode Island from the foundation of the first Baptist church in Providence, some of the founders having been of that persuasion. This church was divided on the issue in question in the year 1653, and the Calvinistic half became extinct. In the year 1771 the surviving Six-Principle wing, which until then had been Arminian in belief, was persuaded by Rev. James Manning, then its pastor as well as the president of Rhode Island College, to adopt a Calvinistic Confession. The churches of this order are entirely confined to New England, and they are gradually becoming extinct. In 1913 the denomination reported 16 churches, 10 ministers, and 731 communicants.

**Baptists, United.** The name taken on their union by Baptist churches in the South once known as "Old Lights," and "Separates" or "New Lights." The divison arose in consequence of the Whitefield revival and was common to several denominations in the seaboard States. Most of the United Baptists came into full fellowship with other (regular) Baptists, with or without dropping the name; but in five Southern States they still maintain not only the name, but a separate organization. They had, in 1912, 196 churches and 13,698 members.

**Baptists, Two-Seed-in-the-Spirit,** a small body, extremely Calvinistic, owing their rise to certain theological vagaries of Elder Daniel Parker, a Baptist preacher of Tennessee from 1806 to 1836. It was sought to explain the doctrine of election by speculation of a Manichæan nature, the gist of which was that some of Eve's offspring were the seed of God and so elect to eternal life; while some, corrupted by Satan, were his seed and foreordained to the kingdom of eternal darkness. They incline toward Antinomianism, object to a paid ministry, and agree with the Primitive Baptists in reprobating "modern institutions." Their strength is in Kentucky, Arkansas, and Texas, though they are found also in 21 other States. In 1890 they had 473 churches and 12,851 members.

**BAPTIST YOUNG PEOPLE'S UNION OF AMERICA.** A society organized in Chicago in 1891. It has its headquarters in Chicago and publishes a monthly magazine, *Service.* It has a large membership throughout the United States and Canada. Consult Bacon and Northrop, *Young People's Societies* (New York, 1900).

**BAR.** A town in the government of Podolia, Russia, on a tributary of the Bug, 106 miles northeast of Kamenetz-Podolsk. Brick making, leather dressing, and distilling are some of its

most important industries, and a trade in grain is carried on. Eleven fairs are held annually. Pop., 1885, 13,434; 1897, 10,614. The "Confederacy of Bar," under the leadership of Krasinski and Pulaski, was formed here, Feb. 9, 1768, with the object of maintaining the independence of Poland and checking the growth of Russian influence.

**BAR.** In heraldry (q.v.), one of the charges known as *ordinaries*.

**BAR.** In hydrography, a bank or shoal formed by the deposition of sand and silt from water. Bars frequently occur at the mouth of a river where the outflowing water with suspended mud is checked in its motion by the sea, the coarser material thus having a chance to sink to the bottom. The sand along the bank of a river, carried to its mouth by the wind and the water, and the sand that is carried inward from the sea by the tidal waves, also contribute to the formation of bars. When the river cuts its way through the obstructing mass at its mouth, a delta may be formed. The decreased velocity of current in portions of a river channel gives rise to bars, which are subject to removals and rebuildings and are capable of causing continual shifting of the river channels. The Mississippi in America, the lower course of the Rhine in Europe, and the Hoang-ho in China present excellent examples of this phenomenon. Bars also form along seacoasts that are swept by tidal currents wherever there is sufficient decrease of velocity to allow a deposition of silt. They occur here as barriers, often of considerable extent, which are separated from the shore by lagoons of salt or brackish water. See HARBOR; DELTA; JETTY; RIVER.

**BAR.** In law, a term originally applied to the rail which separated the court officials from the suitors, their advocates and friends. When an action was brought to trial, the suitors presented themselves at the bar, accompanied by their advocates, who addressed the court from that position. Hence the secondary signification of the term, as denoting those whose profession it is to appear at the bar on behalf of suitors. The advocates or counsel attached to a certain judicial circuit or practicing their profession in a certain county or State are known collectively as the bar of such circuit, county, or State. The term is also employed in a looser sense to designate all the lawyers of a country, as "the American bar," "the English bar," etc. From the word, in this sense, comes "barrister" (q.v.). See also ADVOCATE; ATTORNEY.

**Bar, Plea in.** A plea or defense, which, if supported by evidence, forms a conclusive answer to an action, such as a traverse, or denial, of all the allegations upon which a civil action or criminal prosecution is based. See PLEA.

**Bar, Trial at.** Formerly a trial before all of the judges of a superior court in England, a practice long since discontinued.

**Bar Associations** are voluntary organizations or unions of lawyers, having for their primary object the elevation of the bar. Some of them are local and, to an extent, coöperative. Such is the Association of the Bar of the City of New York. Its active membership is limited to lawyers residing or practicing in the city of New York, and it maintains a fine law library and building for the use of its members. It was established, however, not simply as a social club, nor as a library association, but "to maintain the honor and dignity of the profession of the law and to increase its usefulness in promoting the due administration of justice." There are also State bar associations, whose membership is limited to the lawyers of a particular State. On the other hand, to the American Bar Association any person is eligible who has been a member in good standing of the bar of any State for five years. See BAR ASSOCIATION, AMERICAN.

**Bar Council.** A body of elected barristers (q.v.) supported by the four Inns of Court (q.v.) as the voluntary representatives of the entire English bar, charged with the duty of dealing with all matters affecting the profession. They have no disciplinary authority, but they exercise a strong moral influence as guardians of professional etiquette and, in connection with the Attorney-General and benchers of the Four Inns, may secure the punishment of barristers who are guilty of misconduct.

**BAR.** In music, a vertical line drawn across the stave to divide a musical composition into portions of equal duration and to indicate the accent, which usually falls on the first note. Each of these small portions, called *Measures*, is also popularly termed a bar. The use of the bar dates from the fifteenth century. A double bar formed of two parallel vertical lines is always placed at the end of a composition or of a section thereof. Sometimes at the close of a section it is accompanied by dots, showing that a certain portion is to be played again. See MUSICAL NOTATION.

**BAR,** KARL LUDWIG VON (1836–1913). A German jurist, born at Hanover and educated at the universities of Göttingen and Berlin. He was professor at various times at Rostock, Breslau, and Göttingen. Both as a member of the Reichstag (1890–93) and in his capacity of jurist, he strongly advocated the introduction of publicity and of more humane procedure in criminal cases. He was made president of the Institute of International Law. His important works are: *Das internationale Privat- und Strafrecht* (1862; 2d ed., 2 vols., 1889, under the title *Theorie und Praxis des internationalen Privatrechts*); *Die Redefreiheit der Mitglieder gesetzgebender Versammlungen* (1868); *Die Lehre vom Kausalzusammenhang im Rechte* (1871); *Das deutsche Reichsgericht* (1875); *Staat und katholische Kirche in Preussen* (1883).

**BARA,** bä'rà, JULES (1835–1900). A Belgian statesman. He was born at Tournay and pursued the study of law in his native town, showing remarkable intellectual gifts and a fine power of oratory. Shortly after he had begun the practice of his profession he was summoned to be professor of law at the University of Brussels and presently established his reputation by a treatise on the relations of church and state, the *Essai sur les rapports de l'état et des religions au point de vue constitutionnel* (1859). He was chosen to the House of Deputies from Tournay in 1862 and affiliated himself with the Liberal party, then under the leadership of Frère-Orban. In the fierce conflicts between Liberals and Catholics Bara speedily obtained a reputation as one of the most effective debaters in the Chamber, and, upon the resignation of Tesch as Minister of Justice in 1865, he was appointed by the King to that position. In line with his extremely Liberal tendencies he attempted, in 1868, to bring about the abolition of capital punishment, but failed because of a

powerful opposition in the Senate; in the following year, however, he succeeded in effecting the abolition of imprisonment for debt. After the fall of the Frère-Orban cabinet in 1870 Bara reëntered the Chamber of Deputies and by his great power of invective caused the resignation of the Clerical Ministry of D'Anethau in 1871 and helped to overthrow the Ministry of Malou in 1878. This was followed by the accession of the Liberals to power, and Bara became once more Minister of Justice under Frère-Orban, resigning in 1884 after the overwhelming defeat of the Liberals at the polls. From 1884 to 1894 he was leader of the Opposition in the Lower Chamber, but in the latter year failed of reëlection, entering the Senate soon afterward. He died at Brussels, June 26, 1900.

**BARABA-TATARE,** bä'rä-bä-tä'tä-rā. A steppe in the governments of Tomsk and Tobolsk, West Siberia, between the rivers Irtish and Ob (Map: Asia, G 3). It is a large stretch of low, flat, stoneless land, covered by salt lakes and marshes and traversed by a number of rivers. The lakes all appear to be in process of desiccation, which supports the opinion that the steppe was once the bed of a large lake. The soil is generally fertile, with extensive forests in the north, but the climate is unhealthful. The first Russian settlements were established about 1730.

**BARAB'AS.** The principal character in Marlowe's tragedy, *The Jew of Malta,* a monstrous creature who delighted in slaying others. He poisons nunneries and devises instruments of torture and death. By accident he himself meets the terrible death plotted for a victim. Shakespeare's Shylock is a humanized copy of the character. The rôle was created by Edward Alleyn (q.v.).

**BARAB'BAS.** The name of a prisoner whom Pilate released at the Passover when he condemned Jesus to death. It is the Greek form of *Bar abba,* 'son of the father,' or 'son of the master.' The oldest witnesses as to the text in Matt. xxvii. 16 f. read Jesus before Barabbas, and it is therefore probable that his proper name was Jesus—'son of the rabbi' being added as a distinction. Mark seems to have derived from an earlier source the information that he had been arrested as participant in an insurrection (xv. 6–15). His release may have been particularly gratifying to the people because he was the son of a rabbi. On the text consult especially Adelbert Merx, *Das Evangelium Matthäus,* pp. 400 ff. (c.1902).

**BARABOO,** bär'ä-bōō'. A city and the county-seat of Sauk Co., Wis., 37 miles, by rail, northwest of the State capital, Madison; on the Baraboo River, and on the Chicago and Northwestern Railroad (Map: Wisconsin, D 5). It has a beautiful location, at an elevation of over 1000 feet, in a picturesque region, and is but 3 miles north of Devil's Lake. Two circuses make their winter headquarters here, and there are a historical museum and a library. The city is an important fruit market and has linen and woolen mills, a canning factory, iron mines, railroad shops, and creameries. Manufacturing interests are promoted by good water power. Settled in 1839, Baraboo was incorporated in 1882 and is governed by a mayor, elected biennially, and a municipal council. The water works are owned by the city. Pop., 1900, 5751; 1910, 6324.

**BARABRA,** bä-rä'brä, or **BER'BERINE** (Ar.). A mixed ethnic group, Nubian, Egyptian, and Arab, living on the middle Nile, between the First and the Fourth Cataract. Cephalic index, 76. The Dongolese belong to this group.

**BARACOA,** bä'rä-kō'ä. A seaport town in the province of Santiago de Cuba, on the northeast coast of Cuba, about 90 miles east by north of the city of Santiago (Map: Cuba, L 6). It has a landlocked harbor and exports cocoa, bananas, and other tropical fruits. The industries include the making of oil from the coconut and the manufacture of chocolate. The first settlement of white men on the island of Cuba was made at Baracoa by Velasquez, or Don Diego Columbus, in 1511. This town was the capital of Cuba from 1518 to 1522. Near here Maceo and his handful of followers inaugurated, in February, 1895, the revolution which terminated in Cuban independence. Pop., 1899, 4937; 1907, 5633.

**BARADA,** bä-rä'dä. Supposed to be the Abana of the Bible, and called Chrysorrhoas by the Greeks. A river of Syria, which rises in Antilibanus and, flowing southeastward, passes through Damascus, where it is divided into several branches and empties into the marshy Meadow Lakes, 18 miles east of the city (Map: Palestine, E 1). Its waters are used extensively for the irrigation of the gardens of Damascus.

**BARADAS,** bä'rä'däs', COUNT. A character in Bulwer's *Richelieu,* who conspires against the Cardinal. He is a favorite of Louis XIII, whom he also desires to slay. His plot to place the Duke of Orleans on the throne is discovered just as he is raised to the position of Prime Minister.

**BARAGA,** bär'ä-gä, FRIEDRICH (1797–1868). An Austrian Roman Catholic bishop and missionary. He was born in Carniola, Austria; came to this country in 1830, and spent the remainder of his life in the Chippewa and Ottawa missions in Michigan, becoming first Bishop of Marquette. He prepared a Chippewa grammar (1851) and dictionary (1851–53) and also wrote in Slovenian a work on the *History, Character, Manners, and Habits of the North American Indians* (1837), later translated into French and German, *Dušna Taša,* a Slovenian prayer book, the tenth edition of which (1905) reached 84,000 copies.

**BARAGUAY D'HILLIERS,** bä'rä'gā'dē'yā', ACHILLE (1795–1878). A French general, the son of Louis Baraguay d'Hilliers. He was born in Paris, entered the army, and was wounded at the battle of Leipzig, 1813. He served in Spain in 1823, obtained in 1832 the appointment of lieutenant governor in the military school of St. Cyr, where he suppressed a republican conspiracy, and made a number of campaigns in Algeria. After the Revolution of February, 1848, he was chosen a member of the National Assembly, in which he joined the party of reaction. In the beginning of November, 1849, he went to Rome as commander in chief of the French army sent to sustain the authority of the Pope. He returned in 1850 and in January, 1851, obtained the command of the Army of Paris, in the place of Changarnier. Baraguay d'Hilliers concurred in the policy of the coup d'état of December, 1851, and was made a member of the Consultative Commission. During the Crimean War he received the command of the French Expeditionary Corps of the Baltic and coöperated with the British fleet in the capture of Bomarsund. He was afterward made a marshal of France and took part in the Italian

War of 1859, distinguishing himself at Solferino. In 1871 he was made president of the court appointed to investigate the conduct of the generals who had surrendered fortresses during the war with Prussia.

**BARAGUAY D'HILLIERS,** Louis (1764–1813). A distinguished general of the French Empire. He was born in Paris and, after serving under Custine and Menou, received an appointment in the Army of Italy from Napoleon, serving in the campaigns of 1796–97. He was made a general of division and, after the preliminaries of Leoben, April 18, 1797, became commandant of Venice. He accompanied the expedition to Egypt and headed a division in the Russian campaign of 1812, but on the retreat he incurred the displeasure of Napoleon. He was sent as Governor to Berlin, where he died soon afterward.

**BARANOFF,** bȧ-rȧ'nŏf, Alexander Andreyevitch (1746–1819). The first Governor of Russian America. In 1796 he established a colony on Bering Strait; in 1799 took possession of the largest of the Sitka Islands (now Baranof Island, see below), began trade with the natives, and subsequently extended his operations to Canton, the Hawaiian Islands, Boston, New York, and other distant places. He founded a small colony in California, near the present San Francisco, but this was soon abandoned. He died at sea near Java, while on his return to Russia.

**BARANOF** (bȧ-rȧ'nŏf) **ISLAND.** The most important island of the Alexander Archipelago, off the southwest coast of Alaska (Map: Alaska, N 7). It is about 100 miles long and 25 miles broad in its widest part. Sitka (pop., Sitkan District, 1910, 2210), once the capital of the Territory, is on the northwest coast of the island.

**BARANTE,** bȧ'rȧNt', Amable Guillaume Prosper Brugière, Baron de (1782–1866). A French statesman and historian. While yet young, he was employed in political missions in Germany, Poland, and Spain, and was prefect at Nantes at the time of Napoleon's return from Elba, when he at once resigned. On the Second Restoration he was made Councilor of State and Secretary-General to the Minister of the Interior and was elected to the Chamber of Deputies. In 1819 he was made a peer of France and took an active part in the debates of the Chamber. After the Revolution of 1830 he was sent as Ambassador to Turin and in 1835 filled the same position at St. Petersburg. He supported Louis Philippe and retired from public life on the fall of the monarchy in 1848. His great work is the *Histoire des ducs de Bourgogne* (1824; 8th ed. 1858), which procured for him membership in the Academy. Among his other works are *Histoire de la Convention nationale* (6 vols., 1851–53), *Histoire du Directoire* (1855), *Etudes historiques et biographiques* (1857), and *Etudes littéraires et historiques* (1858). Consult *Souvenirs du baron de Barante,* edited by his grandson (Paris, 1890–99).

**BARASINGHA,** bŭr'ȧ-sin'gȧ. A swamp deer (*Cervus duvauceli*) of northern India—a native name adopted by sportsmen. See Swamp Deer.

**BAR ASSOCIATION,** American. An organization which includes in its membership nearly all the leading lawyers of the United States. It is composed of the State Bar Associations and was founded in 1878. The object of this organization is declared in its constitution to be "to advance the science of jurisprudence, promote the administration of justice and uniformity of legislation throughout the Union, uphold the honor of the profession of the law, and encourage cordial intercourse among the members of the American Bar." Annual meetings are held in different cities for the purpose of discussing matters of interest to the profession. Committees of the association have been engaged for several years in the study of methods for the reform of judicial procedure, uniform divorce laws, and other reforms affecting the legal profession. The annual meeting held in August, 1913, at Montreal had for its chief guest Viscount Haldane, the British Lord Chancellor. At this meeting William H. Taft was elected president. The association has a membership of over 5000 and is exercising a powerful influence in many ways. It has done much to elevate the standard of legal education and to promote uniformity in State legislation upon various subjects.

**BARATARIA,** bȧ'rȧ-tȧ-rē'ȧ. A name, signifying 'deception,' given to an island which appears in fairy tales. In Cervantes' *Don Quixote* Sancho Panza is made Governor of Barataria, but resigns his honors in disgust over his experiences at the inaugural feast, when appetizing dishes are placed before him, but removed before he has a chance to eat.

**BAR'ATA'RIA, Pirates of.** In American history, a company of outlaws who established themselves in and near the Bay of Barataria, La., on the west side of the Mississippi Delta, about 40 miles south of New Orleans, whence they emerged to commit depredations on the shipping of England and Spain. Under the leadership of the notorious Jean Lafitte (q.v.), they rapidly increased in numbers and audacity and succeeded in capturing large quantities of booty, which they disposed of through their agents at New Orleans. Their colony was broken up in September, 1814, by Commander Daniel T. Patterson, of the United States navy. Subsequently Lafitte and a number of his men volunteered for the defense of New Orleans against the British and served with gallantry under Jackson in the battle of Jan. 8, 1815. Consult two articles on "Jean and Pierre Lafitte," by Charles Gayarré, in vol. x of *The Magazine of American History* (New York, 1885).

**BAR'ATHRON.** A deep gorge outside of Athens, originally a quarry, and artificially enlarged, into which criminals condemned to death were hurled. Here the messengers sent by Darius to demand symbols of submission from the Athenians were put to death.

**BARATIERI,** bä'rȧ-tyȧ'rē, Oreste (1841–1901). An Italian general, born at Condino, in the Tirol. He fought under Garibaldi in Sicily in 1860 and after the war against Austria in 1866 joined the regular army. In 1891 he was made Governor of Eritrea, the new possession of Italy on the Abyssinian coast land, in Africa. In pursuance of the ambitious schemes of conquest entertained by the Italians, and in violation of a treaty concluded with the Negus Menelek in 1889, General Baratieri advanced into the highlands of the interior to the west and southwest of Massowah and after a long campaign captured Kassala, in July, 1894. Advancing thence into Tigré (q.v.), he twice defeated the *ras,* or prince, of that country in January, 1895. The conquests of the Italians finally drove Menelek to resistance; the latter's generals took the field with 100,000 men, and

Baratieri was forced to retreat from Adowa, the capital of Tigré, towards Adigrat. Fearing, however, to continue his retreat lest his forces should be thoroughly demoralized, he resolved to attack the Abyssinians, advanced once more on Adowa, and on the morning of March 1, 1896, joined battle on the heights near that place. So fierce was the onslaught of the Shouan forces of Menelek that the Italians were routed, with the loss of 250 officers, 7000 men, and all their artillery. General Baratieri was brought before a court-martial, which absolved him of criminal responsibility, but censured at the same time his conduct of the campaign. Baratieri left the army in the same year. In 1897 he published *Mémoire d'Africa* (1892–96), in the nature of a defense.

**BARATINSKY**, bä'rȧ-tĭn'skė, YEVGENY ABRAMOVITCH (1800–44). A Russian lyric poet and friend of Pushkin. He began writing at an early age, imitating the style of Pushkin and Byron most successfully. While serving as a soldier in Finland, he was impressed by the stern grandeur and picturesqueness of nature, and embodied these aspects in his poem *Eda* (1826), much admired by Pushkin. Generally, however, his poetry is of a most pessimistic character. His study of philosophy and the contemplation of the riddles of the universe had made him so disconsolate that even Pushkin lovingly called him "Hamlet Baratinsky"; and little of his writing, indeed, escaped the "pale cast of thought" that is associated with Shakespeare's Danish hero. Thus *Twilight*, a collection of his minor verse published in 1842, is steeped in melancholy. Finding himself at the parting of the ways, when the old school of Russian poets was about to be superseded, Baratinsky took a most gloomy view of Russian poetry itself. He even despaired of his art, seriously believing that the days of poetry were over. Hence *The Last Poet* elicited much adverse criticism, especially from Belinsky, the dean of contemporary literary critics, who wrote a very elaborate commentary on it. His best lyrical poems are *On the Death of Goethe*, *Finland*, *The Skull*, *The Last Death*, and *The Gypsy*, a popular poem picturing Russian high life. His complete works were published at Moscow (1827, 1835, and 1869; 4th ed., Kazan, 1884). Fiedler's *Russischer Parnass* (Dresden, 1889) contains several of his poems in German translation.

**BARB** (Fr. *barbe*, from *Barbarie*, Barbary). A distinct variety of the Arabian horse cultivated by the Moors of Barbary and introduced by them into Spain. Barbs are less remarkable for their beauty and symmetry than for their speed and endurance when stimulated by the excitement of a contest. The most celebrated barb to leave his mark upon the thoroughbreds of the world was the horse commonly known as the "Godolphin Barb," from the family name of his English owner, the Duke of Leeds (of the Godolphin family). Nearly every race horse of note on the English turf has a strain of the blood of this famous animal, who died in December, 1753, aged 29 years.

**BARB** (i.e., BARBARY), **PIGEON**, etc. See the substantives.

**BAR'BACAN.** See BARBICAN.

**BARBACENA**, bär'bȧ-sā'nȧ. A town in the state of Minas-Geraes, Brazil, about 125 miles north-northwest of Rio de Janeiro (Map: Brazil, J 8). It is situated about 3600 feet above sea level in the Sierra Mantiqueira, and the surrounding district produces cane sugar, coffee, and grain. The town is a commercial centre, being the outlet for the product of mines in the district, but much of its importance has been lost with the development of transportation facilities. Barbacena is noted for its healthfulness and is a popular resort. Pop., about 6000.

**BARBACENA**, FELIBERTO CALDEIRA BRANT PONTES, MARQUIS OF (1772–1841). A Brazilian soldier and statesman, born near Marianna, in what is now the state of Minas-Geraes. In 1823 he was appointed envoy to Portugal to negotiate the recognition of Brazilian independence. He became a member of the Constitutional Assembly, and was elected life Senator in 1826. When in command in 1827 of the Brazilian forces in Uruguay, he was defeated at Ituzaingó. In 1828 he accompanied to Lisbon Maria II, the young Queen of Portugal, whose rights he very skillfully maintained. He was Brazilian Prime Minister in 1829–30.

**BARBACO'AN.** A South American Indian linguistic stock, occupying the region of 1° and 2° N. lat., in southwest Colombia and northwest Ecuador. The chief tribes are the Barbacoas, Colorados, and Cayapas. Regarding the relation of some of these Indians to such semi-civilized pre-Columbian peoples of the region as the Caras, etc., there is much difference of opinion. The Barbacoan stock is of interest from the fact that the famous name *Peru*, as Rivet points out, is probably derived from a word in one of its dialects, signifying 'river' or 'water.' These Indians and their languages have been studied recently by Seler (1886), Rivet (1896–1906, etc.), and Barrett (1909). Rivet seeks to make the Barbacoan a branch of the Chibchan stock. Consult Dr. P. Rivet's "Affinités des langues du sud de la Colombie et du nord de l'équateur" in *Muséon* (Louvain) for 1910.

**BARBA'DOS**, or **BARBADOES**, bär-bā'dōz (Portug. the bearded, from the bearded fig tree, *Ficus barbata*, found there in abundance). The most easterly of the West Indian islands, a possession of Great Britain, situated 78 miles east of St. Vincent, in lat. 13° 4′ N. and long. 59° 37′ W. (Map: West Indies, H 4). It has an area of 166 square miles. The surface, generally flat along the coast, which is surrounded by coral reefs, is elevated in the interior, where Mount Hillaby, the highest point, rises to about 1100 feet. Barbados has a healthful and, for a tropical island, a moderate climate, the mean temperature being about 80°. Earthquakes occur infrequently, but occasional hurricanes have caused great distress.

The soil is especially adapted to the cultivation of sugar cane, the staple product of the island. Of the 106,470 acres occupied by Barbados, about 100,000 acres are under cultivation, nearly one-third of which is devoted to sugar culture. Next in the rank of production come cotton, tobacco, coffee, indigo, and arrowroot. There are numerous sugar works and several rum distilleries, and the fishing interests are of importance. The imports of Barbados in 1911 were valued at £1,345,194 ($6,537,643), and exports £1,088,830 ($5,291,714). The principal articles exported were sugar, molasses, and rum; while the imports consisted largely of textiles, flour, rice, and fish. Manjak, a variety of bitumen, is exported to some extent.

The administration of the island is vested in a governor who is assisted by an executive committee, a legislative council of nine appointed members, and a house of assembly consisting

of 24 members, elected annually by popular vote. Education is under the direction of the government, which also subsidizes the various religious denominations represented on the island. Besides primary and secondary educational institutions, Barbados has Codrington College, which is in affiliation with Durham University, England. Barbados is the headquarters of the British troops in the West Indies. The island has 28 miles of railroad, 470 miles of roads, and 635 miles of telephone lines. The United States is represented by a consulate. The capital and principal port (the only harbor on the island) is Bridgetown (q.v.), which is also the see of a bishop of the Anglican church. The population of Barbados in 1891 was 182,306, and, in 1911, 171,892.

Barbados was first mentioned in the beginning of the sixteenth century and is supposed to have been visited by English seamen in 1605, but it was not colonized until 1625. After having been granted several times to different English noblemen, it was finally, in 1663, assumed by the crown. The continental wars of the eighteenth century were felt severely by Barbados, as the West Indies were the scene of important conflicts in the struggle between France and England. A period of prosperity succeeded the abolition of slavery in 1834. The riots of 1876, resulting from the proposed confederation of the Windward Islands, caused a considerable loss of life and property. Barbados has experienced several disastrous hurricanes, notably those of 1780 and of 1831, and, in more recent times, of 1898, all of which necessitated relief measures on the part of the Imperial government. (See BRITISH WEST INDIES.) Consult Stark, *History and Guide to Barbados* (Boston, 1893).

**BARBADOS CHER'RY.** The name given in the West Indies to the fruit of two small trees or shrubs, *Malpighia urens* and *Malpighia glabra*, which are cultivated for its sake. Clusters of fruit are produced from the axils of the leaves. The fruit of *Malpighia urens* is small; that of *Malpighia glabra* is like a Mayduke cherry in size and appearance, but inferior in flavor. Each fruit contains a three or four angled stone. The leaves of *Malpighia urens* have stinging hairs on the under side.

**BARBADOS GOOSE'BERRY** (*Pereskia aculeata*). A plant not belonging to the gooseberry tribe, but to the cactus family. It is a native of the West Indies and tropical America. The fruit is pear or egg shaped, edible, but possesses expectorant properties. Pereskia plants are of value in that they furnish stocks upon which are grafted other kinds of cacti. *Pereskia aculeata* is chiefly used for this purpose, although *Pereskia bleo* is more vigorous and therefore better suited for use with tall stocks.

**BARBADOS LEG.** COCHIN-CHINA LEG. The common names of elephantiasis, a disease endemic in tropical and subtropical countries, and due to obstruction of the lymph channels by the *filaria sanguinis hominis*. See ELEPHANTIASIS.

**BAR'BARA,** SAINT. A saint of the Roman Catholic church, who, according to legends, suffered martyrdom at Nicomedia, in Bithynia, about 236, or, according to other accounts, at Heliopolis, in Egypt, about 306. She was of good birth, and well educated by her father, Dioscorus. To avoid disturbance in her studies he had a tower built for her, where she spent her youth in the deepest solitude. While in this retirement she was induced to embrace Christianity. Her father, a fanatic heathen, learning his daughter's conversion and failing to induce her to renounce Christ, delivered her up to the governor, Martianus, to be dealt with by the law. Martianus, struck with the intelligence and beauty of the maiden, attempted first by arguments to make her relinquish Christianity and, when that failed, had recourse to the most exquisite tortures. At last the father offered himself to strike off his daughter's head. Scarcely was the deed done, when he was struck with lightning. Hence St. Barbara is to this day prayed to in storms. For the same reason she is the patron saint of artillery, and her image was at one time frequently placed on arsenals, powder magazines, etc. The powder room in a French ship of war is to this day called *Sainte-Barbe*. St. Barbara's day is December 4.

**BARBARA AL'LEN'S CRU'ELTY.** One of the old ballads in Percy's *Reliques of Ancient English Poetry* (q.v.). When her lover, Jemmy Groves, lay on his deathbed, all Barbara Allen said to him was: "Young man, I think you're dying!" For this heartless composure she suffered great remorse.

**BARBARA FRIETCH'IE.** A famous poem by John Greenleaf Whittier (1863), first published in the *Atlantic Monthly*. The poem is based on the report of a patriotic act of an aged woman in Frederick, Md., during the Civil War.

**BARBA'REA.** See CRESS.

**BARBARELLI,** bär'bä-rĕl'lē, GIORGIO. See GIORGIONE.

**BARBARI,** bär'bä-rē, JACOPO DE'. See JACOPO DEI BARBARI.

**BARBA'RIAN** (Gk. *βάρβαρος, barbaros*, non-Greek, barbarian). Among the Greeks, from the time of Homer, a designation for one who spoke a language other than Greek. This restricted signification prevailed until the Roman period. Plato, for example, divides the entire human race into Hellenes and Barbarians. The word is probably onomatopoetic in its origin, intended to represent a meaningless babble of sound, such as the Greeks conceived all foreign languages to be. It first began to acquire its secondary and invidious signification at the period of the Persian wars, when the Greeks, who always exhibited a proud consciousness of their superior intellect and privileges, employed the term to designate the character of their enemies. It then meant whatever was opposed to Greek civilization, freedom, intelligence, or morals: the Romans were naturally included by the Greeks under the general term, and Plautus, in his adaptations of the New Attic Comedy, uses *barbarus* humorously in the sense of 'Roman.' The adjective was not so used, however, by the Romans of themselves, but was employed by them to designate all peoples who differed from the Græco-Roman world in culture and language.

**BAR'BAROS'SA.** See FREDERICK I.

**BARBAROSSA,** HORUK and KHAIR-ED-DIN. Two pirate chiefs, brothers. They were renegade Greeks, natives of Mitylene, and as Turkish corsairs were the terror of the Mediterranean during the first part of the sixteenth century. They made themselves masters of Algeria and Tunis and brought these countries under the sovereignty of the Turkish Sultan. Horuk, the elder of the two, fell in battle against an army of the King of Spain (1518). The younger was more successful. He captured Tunis and fought under Sultan Solyman II

against Charles, defeating the Imperial Admiral Doria, and ravaged the Ionian Islands. He died in 1546. Consult: Lane-Poole and Kelley, *The Story of the Barbary Corsairs* (New York, 1890); Rang and Denis, *Histoire de Barberousse* (Paris, 1837).

**BARBAROUX,** bär'bȧ'rōō', CHARLES JEAN MARIE (1767–94). A French revolutionist. He was born in Marseilles, and as a youth eagerly embraced the doctrines of the Revolution. He was elected a special delegate from Marseilles to the Legislative Assembly in Paris. There he opposed the court and took sides with the Minister, Roland. Upon his invitation the famous battalion which brought the "Marseillaise" to Paris and led in the storming of the Tuileries on Aug. 10, 1792, set out from Marseilles. After the events of the 10th of August he returned to his native town, where he was received with enthusiasm and was soon after chosen delegate to the Convention. In the Convention he adhered to the Girondists and was among those who at the trial of the King voted for the death sentence. But though Barbaroux was among those leaders who refused a respite to the unfortunate Louis, he boldly opposed the party of Marat and Robespierre and even directly accused the latter of aiming at the dictatorship. Consequently he was proscribed as a royalist and an enemy of the Republic in May, 1793. He wandered about the country, hiding himself as he best could, for 13 months, but was taken and guillotined at Bordeaux, June 25, 1794. Barbaroux was a man of striking beauty and of great force of intellect, a sound economist and financier. His *Mémoires* were published in Paris in 1822 and 1866.

**BARBARY APE.** A monkey, native to north Africa and introduced on the rock of Gibraltar. See APE.

**BARBARY POWERS, WARS WITH THE.** From the time of the Middle Ages the Mohammedan powers on the north coast of Africa lived largely by piracy and blackmail, capturing and confiscating (or holding for ransom) the shipping of such nations as did not pay a liberal tribute. In 1785 they began to molest the American shipping, which before the Revolution had been protected by British passes; and the United States government, following the example of European powers, concluded treaties with Morocco (1786–87), Algeria (1795), Tripoli (1796), and Tunis (1799), securing immunity from attack by money payments. The corsairs continued arrogant, however; and in 1801 Tripoli, after having been denied a larger tribute, declared war. American squadrons were sent to the Mediterranean under Commodores Dale (1801), Morris (1802), and Preble (1804); the Tripolitan ports were blockaded and bombarded; a number of the piratical cruisers were captured; and in June, 1805, Tripoli was forced to make peace. The chief events of the war were the grounding and capture of the *Philadelphia* in the harbor of Tripoli (Oct. 31, 1803) and her destruction by Decatur (Feb. 16, 1804), the bombardment of Tripoli, and the celebrated land expedition under William Eaton in 1805. (See BAINBRIDGE, WILLIAM; DECATUR, STEPHEN; EATON, WILLIAM.) Renewed attacks by the Barbary vessels began with the abandonment (in 1810) of the restrictive policy exemplified in the embargo of 1807. (See EMBARGO.) Algeria formally declared war in 1812 and gave considerable assistance to the British in the years 1812–15. In 1815 Decatur, proceeding with 10 vessels to the Mediterranean, speedily brought Algeria to terms and in addition forced Tunis and Tripoli to sign treaties formally renouncing future exactions of tribute. The United States was the first power thus to check the aggressions of the pirates, and her example was soon followed by various countries of Europe. These wars gave an efficient training to the American sailors and demonstrated the futility of Jefferson's famous "gunboat system." Consult: Lane-Poole and Kelley, *The Story of the Barbary Corsairs* (New York, 1890); E. S. Maclay, *History of the Navy* (3 vols., New York, 1894–1901); Allen, *Our Navy and the Barbary Corsairs* (New York, 1905). An excellent account is also given in Henry Adams's *History of the United States from 1801 to 1817* (9 vols., New York, 1889–91).

**BARBARY STATES** (derived from *Berbers;* see below). The countries of Morocco, Algeria, Tunis, and Libya (Tripoli and Barca or Bengazi), in north Africa, known in Roman times as Mauretania, Numidia, Africa Propria, and Cyrenaica. They lie between long. 10° W. and 25° E., and lat. 25° to 37° N. The western half of this region is traversed by the Atlas Mountains, south of which lies the desert tract of the Sahara. Most of the region, while pertaining geographically to Africa, is not specially African in its characteristics; but in geological configuration, climate, flora, and fauna, belongs to the basin of the Mediterranean. It is watered by many small streams, which flow either into the Mediterranean or into a series of salt lakes that lie on the plateaus between the mountain elevations. A large portion of the country is capable of cultivation, and many of the products of the north, fruits and vegetables, are brought to great perfection, the Algerian grape being of particularly fine quality. Millet and other grains are largely grown. Sheep raising is an extensive industry with the Arabs. During the times of the Carthaginians, Greeks, and Romans the region was exceedingly productive, owing to the elaborate systems of irrigation which were constructed. Most of the natural conditions of its ancient productiveness still remain. Among the people, besides the French and other Europeans, several distinct races may be enumerated: Berbers—the ancient autochthonous race from whom comes the name—Moors and settled Arabs, Bedouins or wandering Arabs, Jews, Turks, Kuluglis, and negroes. The Berbers inhabit the open country, while the Moors reside in the towns. Jews settled here in ancient times, but the greater number of that race immigrated at the time of their expulsion from Spain. The Turks entered the Barbary states in the sixteenth century and soon extended their sway westward as far as the borders of Morocco. The Kuluglis (the children of Turks by native mothers) are excluded from the possession of all the paternal rights and privileges. The negroes are not natives, but are brought thither principally from the Sudan and Guinea. The great majority of the population is Mohammedan. Arabic is the language of commerce and intercourse and the mother tongue of Bedouins, Moors, and even Jews. The Berbers proper, in the highlands, to which they have been driven by foreign conquerors, use a peculiar speech.

In the oldest historical times the Mauri (the ancestors of the modern Moors) dwelt in the northwest; the Numidians occupied the interior and eastern parts; and Phœnician colonies were situated on the coasts. The Phœnicians founded

cities—among them Utica, Hippo, Hadrumetum, Leptis, and afterward Carthage—from about 1050 to 850 B.C. Confining themselves to the coast between the Great Syrtis and the Straits of Gibraltar, they maintained commerce with the people of the interior and the seaports of the Mediterranean. In the seventh century B.C. the Greeks founded Cyrene (q.v.) and colonized the plateau of Barca. While the Phœnician colonies held sway on the coast, the Mauri and the Numidians were divided into several independent tribes and, like their neighbors, the Gætuli, were wholly uncivilized. After the Second Punic War the Romans extended their sway over Carthaginian Africa, which became a Roman province at the close of the Third Punic War, when the city of Carthage was sacked and destroyed (146 B.C.). Numidia was annexed after the victory over Jugurtha, and Mauretania after the defeat of Juba and the Pompeians by Cæsar. The son of Juba, bearing the same name, was allowed to reign as a nominal sovereign by Augustus, but Mauretania was in fact a Roman province. The territory thus acquired by the Romans formed some of the largest and most flourishing provinces of their vast Empire. They built large towns, whose extensive ruins are still to be seen scattered over the land, even to the verge of the desert. Everywhere they executed important works, such as the cisterns and aqueducts at Rusicada, Hippo, and Cirta, and the temples and amphitheatres of Calama, Anuna, and Timgad, which clearly show that the inhabitants enjoyed the benefits of a secure civilization. Under Constantine north Africa was divided into nine provinces. (Consult Boissier, *Roman Africa*, Eng. trans., New York, 1899; Bouchier, *Life and Letters in Roman Africa*, Oxford, 1913. For distinguished men of letters in Africa or from Africa, see APULEIUS; FRONTO; TERTULLIANUS.) At the division of the Empire all of these, except one, the Regio Syrtica, fell to the share of the Western Empire. Christianity took a strong hold in Roman Africa, and in the three Mauretanias there were more than 160 dioceses. The decline of Roman power produced a state of anarchy in the African provinces, and they easily fell a prey to the Vandals under Genseric in 429 A.D. The Vandal kingdom continued until 533, when it was overthrown by Justinian's great general, Belisarius (q.v.). The Numidians and the Mauri made themselves masters of the interior and of the coast of Mauretania Tingitana, and the Byzantine territories were restricted to the neighborhood of Carthage and some points on the coast. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

North Africa was swept in 647 by an Arabic invasion, impelled by the first Mohammedan impulse of conquest. The first invader, Abdallah-ben-Said, carried the banner of the Crescent through Tripoli. He was followed by Akbar (665–670), who completed the conquest of Tripoli to the edge of the desert. Hassan, the general of the Caliph Abd-el-Malek, in 692 destroyed the new Carthage. In the course of less than a century the greater part of the native tribes were converted forcibly to the faith of Islam. In 711 the Saracens crossed over from Africa into Spain, which they conquered within three years. In 789 the western provinces of Mohammedan Africa separated themselves from the others, and Edris-ben-Abdallah founded there the dynasty of the Edrisites. In 800 the Governor of the eastern provinces, Ibrahim-ben-Aglab, declared himself independent and founded the dynasty of the Aglabites. From this time down to 1269 the changes of dynasty in Barbary were frequent. Numerous independent states arose. At the close of the eleventh century the Almoravides, who had established their sway in Morocco, made themselves masters of Mohammedan Spain. In the middle of the twelfth century they succumbed to the Almohades. The conquest of the Moors in Spain by the Christians was followed by their settlement on the coast of north Africa, where they began their career of piracy, at first as a retaliation against their Christian foes, but ultimately as a barbarous profession. As early as the time of Ferdinand the Catholic the Spaniards sought to check their ravages, and invaded Africa on several occasions, capturing the ports of Ceuta, Melilla, Oran, Bugia (Bougie), the island before Algiers, and Tripoli. The Portuguese landed on the coast of Morocco, where at first they had great success; but they were ultimately compelled to leave the country. In the course of the sixteenth century Algiers, Tripoli, and Tunis were brought under the government of the Turkish Sultan. Tripoli came under the sovereignty of Italy by the Treaty of Ouchy, Oct. 18, 1912. The Dey of Algiers shook off the authority of Turkey about the beginning of the eighteenth century. The French established their sway in Algeria after a bloody war, which lasted from 1830 to 1847. In 1881 Tunis was placed under French protection. For an account of the modern states comprised within this region, see MOROCCO; TUNIS; ALGERIA; TRIPOLI; FEZZAN; BARCA.

**BARBASTELLE**, bär'bȧ-stĕl (Fr. from Lat. *barba*, beard). A European long-eared bat. See BAT.

**BARBASTRO**, bär-bä'strō. A town in the province of Huesca, Aragon, Spain, on the Vero, 30 miles southeast of Huesca (Map: Spain, F 1). It is the terminus of a branch railway line with a junction at Selgua, 12½ miles distant. The town is an episcopal see, is surrounded by walls, and has a sixteenth-century cathedral, containing paintings by Antonio Galaran. Spirits and soap are manufactured, and wine, oil, grain, fruit, and vegetables are grown. Pop., 1897, 7194; 1900, 7033; 1910, 7202.

**BARBATELLI**, bär'bȧ-tĕl'lē. See POCCETTI, BERNARDINO.

**BAR'BAULD**, ANNA LETITIA (1743–1825). An English author. She was born, June 20, 1743, at Kibworth, Leicestershire, where her father, the Rev. John Aikin, a Dissenting clergyman, kept an academy. Her private education, the religious influence of her home, and secluded life in the country were well fitted to develop early her natural taste for poetry. In 1773 she published her first volume of poems, of which four editions were called for during the year. The same year appeared *Miscellaneous Pieces in Prose*, written conjointly with her brother, John Aikin. This volume was also several times reprinted. The next year she married the Rev. Rochement Barbauld, a Dissenting minister at Palgrave, in Suffolk, where they soon opened a boarding school for boys. The literary fame and exertions of Mrs. Barbauld soon made it known. During the 10 years in which Mrs. Barbauld was engaged in giving instruction here, she published *Early Lessons for Children* and the *Hymns in Prose*—works which have been often reprinted in England and translated into

several languages. Her *Devotional Pieces* was also published during this period. In 1792 she commenced with her brother the well-known series, *Evenings at Home*, which was completed in three years. In 1804 she edited the letters of Samuel Richardson, prefixing to them the best memoir of the novelist that has yet been written; and in 1810 she published a collection of the British novelists in 50 volumes, the task of editing which she had undertaken to divert her mind from the loss she had sustained two years before in the death of her husband. In 1811 she prepared, under the title *The Female Speaker*, a selection from the best English poets and prose writers. Her last published work was an ode, entitled *Eighteen Hundred and Eleven*. All her compositions are characterized by simplicity of feeling, an easy, flowing style, and pure and elevated sentiment. Her *Ode to Life* is an admirable lyric. She lived in quiet retirement until her death, March 9, 1825. Consult: Aikin, *Works of A. L. Barbauld*, with memoir (London, 1825); Mrs. Oliver (formerly Mrs. Ellis), *Memoir of Mrs. Anna Letitia Barbauld* (Boston, 1874); Mrs. Thackeray-Ritchie, *Book of Sibyls* (London and New York, 1883).

**BARBE-BLEU**, bärb'blœ' (Fr. Bluebeard). 1. A light opera presented in 1866, libretto by Meilhac and Halévy, score by Offenbach. 2. Comic opera by Sedaine, with score by Grétry, performed in Paris, 1789. See BLUEBEARD.

**BAR'BECUE.** A term originally applied, in the Southern States especially, to the practice of roasting a hog, ox, or other large animal entire, by splitting it to the backbone and placing it on a rude gridiron of stakes. The use of the word is now extended to mean a large public entertainment, held in the open air, where animals are roasted whole, and food and drink of all kinds are provided in liberal quantities. The word was in use in Virginia before 1700. The origin of the name "barbecue" is disputed. Some think it comes from the Indians of Guiana, who used the word *berbekot* to denote the wooden grills on which they smoked or dried their meats and fish. Others would derive it from the Haitian *barbacóa*, identical in meaning with *berbekot*, while still others have traced the term to the French *barbe-à-queue*, i.e., 'from snout to tail.'

**BARBED AND CREST'ED.** Heraldic terms indicating that the gills and combs of a cock are of a different tincture from the body. The common English designation is "wattled and combed," with the name of the tincture.

**BARBED WIRE.** See WIRE.

**BAR'BEL** (LL. *barbellus*, dimin. of *barbus*, same meaning, from Lat. *barba*, beard). An Old World carp-like fresh-water fish of the cyprinoid genus *Barbus*, with four fleshy appendages (barbules) hanging from the snout and upper jaw, which project beyond the inferior mouth and are of use in plowing through the mud in search of food. The common one (*Barbus vulgaris*) is abundant in the streams both of England and continental Europe and may reach a weight of 15 to 18 pounds. It affords some sport to the angler, but its coarse flesh is seldom eaten. The genus is very numerous in edible species in the waters of Asia, the East Indian Archipelago, and tropical Africa, and some reach a length of 6 feet. The best known from the angler's point of view is the mahaseer (*Barbus mosal*) of the mountain streams of the Himalayas and other parts of Asia, the scales of which in large specimens are as large as one's hand. See Plate of CARPS AND ALLIES.

**BARBE-MARBOIS,** bär'bâ' mär'bwä', FRANÇOIS, MARQUIS DE (1745–1837). A French statesman. From 1779 to 1785 he was connected with the French embassy in the United States. He married (1783) a daughter of William Moore, of Pennsylvania. In 1785 he was Governor of Haiti, where he introduced many reforms. In 1797 he was exiled to Guiana for political reasons, but was recalled in 1799 and made Minister of Finance in 1801. He negotiated the sale of Louisiana to the United States and obtained 30,000,000 francs more than Napoleon really asked, for which he was liberally rewarded. He was a member of the Senate in 1813 and favored the restoration of the Bourbons, for which Louis XVIII made him a Peer of France and Minister of Justice. After the Revolution of July he swore fealty to Louis Philippe. Among his works are writings on Santo Domingo and Guiana, on the treason of Arnold, and on the cession of Louisiana.

**BAR'BER** (ME. *barbour*, OF. *barbeor*, from Lat. *barba*, beard). One who shaves the beard and ordinarily includes hair cutting in his profession. The office is of great antiquity and is referred to by the prophet Ezekiel: "And thou, son of man, take thee a barber's razor, and cause it to pass upon thine head and upon thy beard." From ancient monuments and papyri we know that the Egyptians shaved both the beard and the head. In all Eastern countries, including China, the shaving of the whole or part of the head continues to be performed by barbers. The barber shops of Athens and Rome were great meeting places for idlers and gossips, and in provincial towns they continue to serve some such purpose up to the present day.

The most important and dignified portion of the history of barbers relates to the period when in all European countries they had the right to practice elementary medicine and surgery and were known as *barber surgeons*. Relics of this combination of functions are the brass basin, still hung out as a sign at the door of European barber shops, and the red band about the pole, which represents the bandage with which they stopped the bleeding incident to their operations. The existence of barbers as professors of the healing art can be traced in England as far back as 1461, when they were first incorporated. In 1546 they were united with the surgeons. The connection was dissolved by an Act of 1745, whose preamble asserts that the business or trade of a barber is "foreign to, and independent of, the practice of surgery"; at the same time the privileges of the barbers as a company or corporation were expressly preserved to them. In Markwell Street, Cripplegate, London, the ancient hall formerly used by the barber surgeons is still standing.

In France barber surgeons were organized in 1371 into a corporation which was under the jurisdiction of the King's barber and which existed until the Revolution. In the seventeenth century wigs (q.v.) became so elaborate that a distinct corporation was formed of *barbiers perruquiers*, who also shaved and cut the hair. In Germany, though the trade of the barbers was long connected with the art of surgery, they were not formed into a corporation until 1773 (in Prussia, 1779). This was dissolved in 1809, and new unions were formed in the middle of the century with strict regulations. In the

United States to-day the barbers are well organized in the International Union, which dates from 1887 and maintains an *esprit de corps* unsurpassed by any other labor organization. It not only regulates wages and the hours of labor, but fixes prices to be charged to patrons—a rare instance in which employees, rather than employers, make prices for the public. Every raise in barbers' wages must, under union rules, be followed by a corresponding increase in prices and vice versa. Consult *Annals of the Barber Surgeons of London* (London, 1890), and L'Espinasse, *Les métiers et corporations de la ville de Paris* (Paris, 1886–97). See BEARD; HAIR DRESSING.

**BARBER.** A widespread South African catfish (*Clarias capensis*). It reaches 50 to 60 pounds in weight, and young ones are esteemed as food; it is also one of the main resources of crocodiles. It takes the hook readily and gives some sport in overcoming its pluck and strength.

**BARBER,** FRANCIS (1751–83). An American soldier, born at Princeton, N. J. He graduated at the College of New Jersey (Princeton) in 1767, and in January, 1776, entered the American army as major of a New Jersey regiment. He became a lieutenant colonel in November of the same year, was adjutant-general successively under Lord Stirling and General Sullivan, and was seriously wounded at the battles of Monmouth and Newtown and the siege of Yorktown. In 1781 he was selected by Washington to break up a mutiny of the New Jersey and Pennsylvania troops—a duty he performed with singular tact and discretion. He was accidentally killed by a falling tree at Newburgh, N. Y., on Feb. 11, 1783. His order book during Sullivan's expedition against the Indians in 1779 is in the possession of the New Jersey Historical Society.

**BARBER,** JOHN WARNER (1798–1885). An American historian, born at Windsor, Conn. He published: *Historical Scenes in the United States* (1827); *Religious Events* (1832); the *Historical Collections of Connecticut* (1836) and of *Massachusetts* (1839); *Elements of General History* (1844); and *Our Whole Country, Historical and Descriptive* (1861). He also assisted Henry Howe in compiling the historical collections of New York, New Jersey, Virginia, and Ohio.

**BARBERINI,** bär'bȧ-rē'nē. The name of a celebrated Italian family, prominent in connection with the history of the papacy in the seventeenth century. The Barberini settled in Florence in the eleventh century and became prominent in various ways. Francesco Barberini, a contemporary of Dante, was a jurist and poet. Raffaelle Barberini was an engineer and was employed by the Duke of Alva in a diplomatic capacity. The family became powerful through Maffeo Barberini, who was elected Pope in 1623 as Urban VIII. He appointed his brother Carlo commander of the papal forces; another brother, Antonio, was Cardinal and papal librarian. Francesco, a son of Carlo, was also Cardinal, and is known as the founder of the Barberini Library and the builder of the Barberini Palace at Rome. He was a man of learning and translated Marcus Aurelius. Taddeo, a brother of Francesco, became commander of the papal forces, was appointed Prefect of Rome, and received the principality of Palestrina. He attempted to wrest Castro from the Farnese family of Parma. Antonio, a brother of the two preceding, likewise a Cardinal, was invested with the duchy of Urbino. The wealth and power of the Barberini excited the jealousy of other Italian nobles, and when Urban's successor, Innocent X, ascended the papal throne, he called the nephews of Urban to account for the mismanagement of their various offices. They were forced to flee, and took refuge in France. Later the family regained their influence in Rome. The principality of Palestrina remained in possession of the Colonna branch of the Barberini family until 1889, when the male line became extinct. The title then passed by marriage to Marquis Luigi Sachetti, who assumed the name of Barberini and the title of Prince of Palestrina. Consult Reumont, *Beitrage zur italienischen Geschichte*, vol. v (Berlin, 1867), and Thomus, *Francesco da Barberini* (Paris, 1883).

**BARBERINI FAUN.** A statue in Parian marble, an example of Greek sculpture, so called because once the property of the Barberini at Rome. It is now in the Glyptothek at Munich. It was found between 1627 and 1641, near the Castello di Sant' Angelo. Consult Heinrich Bulle, "Der Barberini Faun," in *Jahrbuch des kaiserlich deutschen archaologischen Instituts* (Berlin, 1901); Furtwängler, *Beschreibung der Glyptothek zu Munich*, pp. 199–206 (Munich, 1900).

**BARBERINI PAL'ACE.** The home of the Barberini in Rome, the erection of which was undertaken by Urban VIII, the most celebrated of the family. It was not completed, however, till 1640. Its picture gallery contains Guido Reni's "Beatrice Cenci"; Domenichino's "Adam and Eve Being Driven out of Paradise," and Albert Dürer's "Christ Disputing with the Doctors." Its library, which contains upward of 70,000 volumes and 10,000 manuscripts, now forms part of the library of the Vatican.

**BARBER OF SEVILLE.** See BARBIER DE SÉVILLE.

**BAR'BER POET,** THE. See JASMIN, JACQUES.

**BAR'BER'RY** (of uncertain origin). *Berberis.* A genus of plants of the family Berberidaceæ (q.v.), consisting of two subgenera that are sometimes ranked as genera. Those with simple leaves form the subgenus *Berberis*, and those with pinnate leaves, the subgenus *Mahonia*, or ash-leaved barberry. The species are low, ornamental shrubs and native to the temperate regions of both hemispheres. The flowers are yellow and have sensitive stamens. The leaves are various shades of green and are sometimes variegated. A yellow fungus, *Æcidium berberidis*, is very general upon the under side of the leaves. This is the "æcidium state" of the common grain rust (*Puccinia graminis*, q.v.), and hence in wheat-growing districts the planting of barberry is not advised. The fruit is a red, dark-blue, or black berry with two or three seeds. It is generally too acid to be eaten, but is sometimes used to make jelly and preserves —barberries cooked with molasses being an old-fashioned kind. Free malic acid is extensively prepared from the fruit in France. The fruit of the sweet barberry (*Berberis dulcis*), a native of Chile, resembles in size and color that of the black currant. *Berberis aristata* and *Berberis asiatica* also produce wholesome and pleasant fruits, which are dried like raisins. The yellow root of the barberry, especially the inner bark, is used for dyeing, as is also that of the stem and branches. The bark has also been used for tanning. *Berberis lycium*, a native of northern India, is particularly astringent, and an extract

prepared from it is used in ophthalmia. *Berberis vulgaris* is the most common species used for ornament. See Plate of BALSAM, ETC.

**BARBERRY RUST.** See RUST.

**BAR'BER'S ITCH** (*Tinea sycosis; sycosis parasitica;* ringworm of the beard). A parasitic disease of the bearded parts of the face, caused by the entrance into hair follicles of a fungus, the *trichophyton*. An eruption appears in the form of a ring, red and scaly, and increasing by the enlarging of the outer limits of the ring. Later the red area swells, and hard nodules form, which rupture and exude yellowish pus. This dries and forms crusts, covers the skin, and causes irritation and itching. The disease results in the destruction of the hair and may persist indefinitely unless treated thoroughly or may relapse repeatedly. The upper lip is very rarely attacked, the disease confining itself, as a rule, to the chin and adjacent parts of the neck and submaxillary regions. Barber's itch is contagious and is conveyed most commonly, as its name implies, by infected hands, towels, brushes, or razors.

**BAR'BERTON.** A mining town of the Vaal River Colony, South Africa, in the district of Lydenburg, about 70 miles west of Lourenço Marques, with which it is connected by rail (Map: Transvaal Colony, E 2). It lies in a mountainous region, 2800 feet above the sea, in the centre of the De Kaap gold fields. Barberton was founded in 1885 and grew rapidly. The town is a health resort. Pop., 1907, 2379. In the early part of the Boer War of 1899–1902 British prisoners were confined here until the Boers were driven out by the English troops.

**BARBERTON.** A city in Summit Co., Ohio, 7 miles south by west of Akron, on the Baltimore and Ohio, the Erie, the northern Ohio, and the Pennsylvania railroads and on the Ohio Canal (Map: Ohio, G 3). It manufactures matches and match machinery, boilers, chemicals, sewer pipe, valves and fittings, artificial lumber, rubber, porcelain, paint, etc. Barberton, originally known as New Portage, was settled about 1815 and was first incorporated in 1892. The government is vested in a mayor, elected biennially, and a unicameral council. The water works and light plant are owned and operated by the city. Pop., 1900, 4354; 1910, 9410; 1920, 18,811.

**BARBÈS,** bär'bĕs', ARMAND (1809–70). A French revolutionist. He was a leader of secret political societies, was at various times imprisoned, and in 1839 was sentenced to death as the main instigator of an attempted insurrection against Louis Philippe. While in prison he wrote *Two Days under Condemnation of Death.* He was pardoned and chosen (1848) to the Constituent Assembly, but in the same year, with Raspail and others, was sentenced to life imprisonment for inciting insurrection against the Assembly. When set free by Napoleon III in 1854, he refused to receive pardon, asking to be allowed to return to jail; but this was denied him, and he left the country. Consult La Brugère, *Le procès Armand Barbès.*

**BAR'BET** (Fr. from Lat. *barbatus,* bearded). Any bird of the tropical family Capitonidæ, so called in reference to the prominence of bristles about the mouth. The barbets, together with the honey guides, form the order Scansores. There are considerably over 100 forms, distributed through the tropical forests of both the Old and New Worlds, being absent only from the West Indies and Australia. They are stockily built birds, usually less than 6 inches in length and often gorgeously colored. The juxtaposition of most vivid and extreme pigments, however, produces an inharmonious and harsh effect. Barbets haunt the tree tops or climb about the branches in search of food, which consists mainly of insects and to a less extent of fruit. They nest in holes, excavating for themselves in soft or decaying wood. Three to five oval white eggs are laid. See Plate of TROGON, HOOPOE.

**BARBETTE,** bär-bĕt' (Fr. dim. of *barbe,* Lat. *barba,* beard). In military fortification, a term applied to the platform on the inner side of a parapet or rampart on which a heavy gun is mounted. It is built at such an elevation that the gun may be fired over the crest of the parapet instead of through an embrasure. In this way the gun may be moved in different directions. In the United States and British navies the term is commonly used to designate the armored structure surrounding and protecting the bases of guns or turrets, but which is more properly called a *barbette tower.* These towers are almost invariably of circular form, the armor extending down to the protective deck, except when it is protected by the armor on the ship's side, while the supporting framework, somewhat changed in form as it goes down, extends to the inner keel. Inside the tower is the machinery for operating guns and supplying them with ammunition. See FORTIFICATION; SHIP, ARMORED.

**BARBETTE GUN.** A gun mounted for firing over a breastwork or parapet and not through a porthole or embrasure. On board ship guns are mounted *en barbette* in barbette towers. See COAST ARTILLERY; GUNS, NAVAL; ORDNANCE.

**BARBETTE TUR'RET.** A revolving tower or turret mounted above a fixed barbette tower. Turrets are now generally oval or ovoidal in plan, and the side in rear of the guns projects beyond the walls of the barbette tower to form the "overhang". See TURRET.

**BARBEY D'AUREVILLY,** bär'bā' dō'rə-vē'yē', JULES AMÉDÉE (1808–89). A French writer, born at Saint-Sauveur-le-Vicomte (Manche). He was one of the founders (1858) and editors of the *Réveil* and for a number of years contributed literary articles to the *Pays.* His works, in both fiction and criticism, are original, sometimes grotesque in flavor. They include: *Du dandysme et de George Brummel* (1845; 3d ed., 1880); *Les prophètes du passé* (1851); *L'ensorcelée* (1854); *Portraits critiques* (1863); *Le chevalier Des Touches* (1864); *Goethe et Diderot* (1880). Consult Eugène Grelé, *Jules Barbey d'Aurevilly, sa vie et son œuvre* (1902).

**BAR'BICAN** (LL. *barbacana, barbicana;* perhaps akin to Ar. *barbakh,* aqueduct, sewer). A fortified advanced work protecting a passage, gate, or postern of a city or fortress, usually at the head of a drawbridge. The barbican was used in all well-fortified places to facilitate sallies or protect a retreat. It was built of wood or earth, or stone, provided with a ditch and often with a flying bridge. Usually it was semicircular. Even temporary camps had large barbicans to mask and protect manœuvres. The permanent examples in stone at Carcassonne (q.v.) are of unusual importance. Sometimes

they were closed across their end so as to make it difficult for the enemy to enter the city, even after it had been captured. The famous English castles of Alnwick and Warwick still retain their barbicans. In an assault the barbican was usually captured before the outer bailey. Sometimes the barbican took the form of parallel walls advancing from the outer gate and inclosing a narrow passage to hem in the attacking force; sometimes that of a double tower on each side of a gate or bridge, and it often also served as a watchtower. From the peculiar form of the long, narrow, flaring openings pierced in such works, the term "barbican" came to be applied to such shaped openings, loopholes, or embrasures, even when they were used in other structures to let in light, to ventilate, or to carry off water from foundations. See BAILEY; BASTION; CASTLE; FORTIFICATION.

**BARBIÉ DU BOCAGE,** bär'byā' dụ bō'kâzh', JEAN DÉNIS (1760–1825). A French geographer. He was born and died in Paris. After holding several important government positions he became professor in the Collège de France in 1809 and in 1821 was one of the founders of the French Geographical Society. His best-known works are his historical and geographical atlases. He also wrote, in conjunction with Sainte-Croix, *Mémoires historiques et géographiques sur les pays situés entre la Mer Noire et la Mer Caspienne* (1796).

**BARBIER,** bär'byā', ANTOINE ALEXANDRE (1765–1825). A French bibliographer. He was born at Coulommiers, studied at the Normal School, and took orders, but in 1793 left his curacy and in 1794 was appointed a member of the commission for the preservation of objects of art and science. He was delegated to collect and distribute among various libraries the valuable books obtained at the time of the Revolution through the suppression of ecclesiastical establishments. He was appointed librarian to the Directory and was also private librarian to Napoleon I, in which capacity he founded the libraries of Fontainebleau, Compiègne, Saint-Cloud, and the Louvre. At the Restoration he became director of the Crown Library and continued in that post until 1822. His bibliographic works include *Catalogue des livres de la bibliothèque du Conseil d'Etat* (2 vols., 1801–03), *Dissertation sur soixante traductions françaises de l'Imitation de Jésus-Christ* (1812), and, chiefly, *Dictionnaire des ouvrages anonymes et pseudonymes* (4 vols., 1806–09), a work of much value to the student of literature for the period it covers.

**BARBIER,** HENRI AUGUSTE (1805–82). A French poet and novelist, born in Paris. He is remembered chiefly for his satires, *Les iambes* (1831), political and social castigations of the predominant types in the bourgeois monarchy of Louis Philippe, though the morals of the aristocracy were not spared. These satires still possess a social and historical value. The most famous of them is *La curée*. Of his other works, *Il Pianto*, dealing with Italy, and *Lazare*, with Ireland, though greatly inferior, rank next in importance. Barbier was elected to the Academy in 1869 and died at Nice, Feb. 12, 1882.

**BARBIER DE SÉVILLE,** bär'byā' de sā'vēl' (Fr. barber of Seville). 1. A work by Beaumarchais (q.v.), rejected (1772) as a comic opera, and subsequently given its present form as a comedy. (See FIGARO.) 2. A light Italian opera (*Il barbiere di Siviglia*): (*a*) by Paisiello, with adaptation of Beaumarchais's comedy as the libretto (given in St. Petersburg in 1780 and in Paris in 1789); (*b*) by Rossini, with book again adapted from Beaumarchais (given in Rome in 1816 and in Paris in 1819). At first unpopular, it has become one of the favorite operas.

**BARBIERI,** bär-byā'rê, GIOVANNI FRANCESCO. See GUERCINO.

**BAR'BITON,** or **BAR'BITOS** (Gk. *βάρβιτον, βάρβιτος*). A special form of the lyre, derived by the Greeks from Persia and much used on Lesbos and among the Ionians. It seems to have had more than seven strings, exceptionally long, and to have yielded a deep tone. It may be the instrument, with a small sounding board and long arms, which is carried by Alcæus and Sappho on a vase in Munich. See LYRE.

**BARBIZON,** bär'bê'sōN'. A village in the department of Seine-et-Marne, France, 5 miles northwest of Fontainebleau. It has given its name to a school of French landscape painters. (See BARBIZON, THE PAINTERS OF.) Its picturesque situation on the edge of the forest and association have made it a favorite resort for artists and tourists. Pop., 1906, 484; 1911, 507.

**BARBIZON,** THE PAINTERS OF. A group of French painters of landscape, animal, and peasant subjects, so called because they resided and practiced chiefly at Barbizon. They are often called the Barbizon school, but, properly speaking, they do not form a school, but were a group of men with similar aims and principles. Situated on the edge of the forest of Fontainebleau, Barbizon offered countless varieties of scenery, both wild and cultivated. The cardinal principles of these painters were twofold. 1. Each painting must be studied directly from nature. This gave them the firm grasp upon truth and life that has made their art permanent. 2. Every painting should express a mood or sentiment of the artist. The result was the poetic character which lends to their work its principal charm, each picture rising to the dignity of a hymn to nature. They belonged to the Romantic school of painting (see PAINTING, *History*), and their work represents the romantic principle applied to the landscape. They were not really revolutionaries, as has been represented, but took up the development of the landscape where the Dutch and English had left off. (See LANDSCAPE PAINTING.) The English influence, however, has been greatly exaggerated. It is maintained that the school owed its origin to the exhibition of Constable's (q.v.) works at Paris in 1822; but at that time Rousseau and Dupré were lads of 12, while Corot was still in Italy. They learned far more from the fine collection of Dutch paintings, especially those of Ruysdael, in the Louvre. Dupré alone visited England, where he was influenced by Constable. The pioneer and broadest genius of them all was Théodore Rousseau, who first went to Barbizon. Besides his the greatest names are those of Jules Dupré, their most pronounced Romanticist, Corot, the poet painter of morning and evening; Diaz de la Peña, painter of the sunny woodland, Daubigny, the painter of orchards, gardens, and river scenery, Troyon, the cattle painter, and Jean François Millet, greatest of

all peasant painters. See articles on these artists.

The painters of Barbizon are probably the most important group of landscape painters in the history of art; they depicted varied phases of nature, made great progress, and had a wide influence upon the general development. For their art not only affected landscape painting of northern Europe, but profoundly influenced that of the United States, which is for the most part essentially mood painting and unintelligible without Barbizon. They are better represented in American galleries, such as the Metropolitan Museum of Art and the Vanderbilt collection, New York, and the Quincy Shaw collection of Boston, than in any others in the world, except only the Louvre.

Consult the spirited narrative of Muther, *History of Modern Painting*, vol. ii (London, 1907), Van Dyke, *Modern French Masters* (New York, 1906), and the special works on the *Painters of Barbizon* by Mollet (London, 1895), D. C. Thompson (ib., 1902), Arthur Tomson (ib., 1908); La Farge, *The Higher Life in Art* (New York, 1908), an able and intimate account of the Barbizon men.

**BARBON.** See BAREBONES.

**BARBOSA DU BOCAGE,** bär-bō'sȧ dụ bō'käzh'. See BOCCAGE, MANOEL MARIA BARBOSA DU.

**BARBOSA-MACHADO,** bär-bō'zȧ-mä-shū'dụ, DIEGO (1682–1770). A Portuguese bibliographer. He was born in Lisbon, took holy orders in 1724, and received the appointment of abbot of the convent of Lamo-Adrião de Sever. Here he remained until his death, engaged in the preparation of a monumental work which contains biographical notices of all the Portuguese and Brazilian authors. It is called *Bibliotheca lusitana antiqua e nova, historica, critica e chronologica, na qual se comprehende a noticia dos autores portuguezzes, e das obras que compuzezão desde o tempo da promulgação da ley de graça, até o tempo presente* (4 vols., Lisbon, 1741–52). A summary of this was arranged by Bento José Farinha, *Sumario da Bibliotheca lusitana* (4 vols., Coimbra, 1820).

**BARBOU,** bär'bōō', JOSEPH GÉRARD (1715–1813). The most important representative of the firm of French printers of that name. Of his publications the best known are to be found in his continuation, in duodecimo, of the series of Latin classics begun by Antoine Coustelier, at the instance of the Abbé Lenglet Dufresnoy. These volumes of his are still justly noted for their careful text and excellent typography.

**BARBOUR,** bär'bẽr, ERWIN HINCKLY. An American geologist. He was born near Oxford, Ohio, and was educated at Miami University and at Yale, where he graduated in 1882. He was assistant palæontologist to the United States Geological Survey from 1882 to 1888, and Stone professor of natural history and geology at Iowa College from 1889 to 1891. He became professor of geology in the University of Nebraska, acting State Geologist, curator of the State Museum, geologist of the State Board of Agriculture, and director of the annual Morrill geologic expeditions. Following his work in Nebraska he was engaged in United States geologic and hydrographic surveys.

**BARBOUR,** JAMES (1775–1842). An American politician. He was a member of the Virginia Legislature from 1796 to 1812; was Governor of the State for two terms, and was a member of the United States Senate from 1815 to 1825, when he became Secretary of War in the cabinet of President J. Q. Adams. He was appointed Minister to England in 1828, but was recalled by Jackson in the following year. He presented a bill to establish a United States Bank, was author of the anti-dueling act of Virginia, and presided over the national convention that nominated Harrison and Tyler.

**BARBOUR,** JOHN (c.1316–c.1395). The first of the early Scottish poets, regarding whom history has not much to record beyond the production of the national epic, entitled *The Brus*, the subject of which is Robert Bruce. The ascertained facts of Barbour's life may thus be summarized: Born about 1316, he was Archdeacon of Aberdeen in 1357 and held that office till his death; in 1357 he traveled into England, accompanied by three scholars, on a visit to Oxford; in 1365 he obtained a passport "to travel through England with six companions on horseback toward Saint Denis and other sacred places"; in 1368 he again received permission to travel through England with two servants and two horses, on his way for scholarly purposes to France; in 1373 he was clerk of audit of the household of King Robert II and one of the auditors of exchequer; in 1375 his great poem was more than half finished; in 1377 he had a gratuity of £10 from King Robert II; in 1378 he received from the same prince a perpetual annuity of 20s., which in 1380 he bequeathed to the dean and chapter of Aberdeen, under the condition that they should sing a yearly mass for the repose of his soul; in 1381 he had a gift from the crown of the wardship of a minor whose estate lay within the parish of which he was rector; in 1383, and again in 1385, he was one of the auditors of exchequer; in 1388 King Robert II granted him a pension of £10 a year; and he died probably on March 13, 1395. Besides *The Brus*, two other poems have, with reasonable certainty, been assigned to Barbour: *The Legends of the Saints*, and a poem on the Trojan War, of which only fragments remain. *The Brus* is distinguished by great purity and clearness of style, the language and versification contrasting advantageously with those of any contemporary English poet except Chaucer. Barbour's imagery is not rich, but he is seldom other than lively, simple, and energetic. He has depicted, in rough but faithful outline, the life, manners, and deeds of a truly heroic time and given to his country the first poem in her literature and the earliest history of her best and greatest king. Consult: *The Brus*, ed. by Skeat for Early English Text Society (London, 1870–89) and for the Scottish Text Society (Edinburgh, 1894); *Legends of the Saints*, ed. by Metcalfe for Scottish Text Society (Edinburgh, 1896); and Horstmann, *Barbour's Legendensammlung, nebst den Fragmenten seines Trojanerkrieges* (Heilbronn, 1881–82). Consult also Andrew Lang's *History of Scotland* (1900). See ENGLISH LITERATURE; SCOTTISH-GAELIC LITERATURE.

**BARBOUR,** OLIVER LORENZO (1811–89). An American lawyer and legal writer. He was born at Cambridge, N. Y., studied law, was in 1832 admitted to the bar, and was reporter of the New York Court of Chancery in 1847–49. From 1848 to 1876 he was reporter of the State Supreme Court. He published *Equity Digests* (1836–41), *Treatise on the Practice of the Court of Chancery* (1843), and many other works.

**BARBOUR,** PHILIP PENDLETON (1783–1841).

An American jurist. He was born in Virginia and studied law at William and Mary College. From 1812 to 1814 he was a member of the State Legislature, from 1814 to 1821 was in Congress, being Speaker of the House in 1821, and later was a judge of the Virginia General Court. Again, from 1827 to 1830, he was in Congress, and from 1836 until his death was an associate justice of the United States Supreme Court. He was a strong Southern partisan on the Missouri Question.

**BARBOUR,** RALPH HENRY (1870– ). An American author, born at Cambridge, Mass. He contributed verse and short stories to magazines under the pen name of "Richard Stillman Powell," but became best known under his own name for entertaining boys' stories. His writings include: *The Halfback* (1899); *Captain of the Crew* (1901); *On your Mark* (1904); *Four in Camp* (1905); *Four Afoot* (1906); *Holly* (1907); *Four Afloat* (1907); *Forward Pass* (1908); *Double Play* (1909); *Winning his "Y"* (1910); *Team Mates* (1911); *Cupid en Route* (1912); *The Junior Trophy* (1913); *Peggy-in-the-Rain* (1913).

**BARBOURSVILLE.** A town in Cabell Co., W. Va., 9 miles by rail east of Huntington, the county-seat; on the Guyandotte River and on the Chesapeake and Ohio, and the Guyandotte Valley railroads (Map: West Virginia, B 3). It is the seat of Morris Harvey College (Methodist Episcopal, South), opened in 1888, and the Kuhn Memorial Hospital, and is of historic interest as the scene of a conflict in the Civil War, July, 1861, which terminated in a Federal victory. Barboursville became a town by an Act of the Virginia Legislature in 1813, was incorporated in 1867, and formerly was the county-seat. The town has manufactories of lumber and brick and owns its water works and electric light plant. There are deposits of coal, oil, and gas in the vicinity. Pop., 1900, 429; 1910, 907.

**BAR'BOURVILLE.** A town and the county-seat of Knox Co., Ky., 188 miles by rail southeast of Louisville; on the Cumberland River, and on the Louisville and Nashville Railroad (Map: Kentucky, G 6). The principal industries are agriculture, coal mining, and lumbering; there are several saw and grist mills. Oil wells of considerable promise have been drilled, and the country is developing rapidly. Pop., 1890, 1162; 1900, 1010; 1910, 1633.

**BAR'BOX BROTH'ERS.** A short story by Charles Dickens in *All the Year Round* (1866). There is a second part entitled *Barbox Brothers & Co.*

**BARBOZA.** See CALDAS-BARBOSA.

**BARBUDA,** bär-bo͞o'dȧ (Portug. island of bearded men). One of the Leeward Islands in the British West Indies, situated 20 miles north of Antigua (q.v.), of which it is a dependency (Map: West Indies, G 3). The island, of coral formation, has an area of 73 square miles, with a generally level surface, which is to some extent covered with forests. The main occupation of the inhabitants is cattle raising. In 1911 Barbuda had a population of 775, mostly colored.

**BARBUDO,** bär-bo͞o'dō, or **BARBU,** bär-bo͞o'. Names given to the thread fins of the genus *Polydactylus,* within the family Polynemidæ and the suborder Rhegnopteri, small fishes of the warmer American seas allied to the sand launce. The commonest species (*Polydactylus virginicus*) is a food fish of some importance in the West Indies and Florida, found in abundance off sandy shores. It is illustrated on the Plate of MULLETS AND ALLIES.

**BAR'BY.** A town in the province of Saxony, Prussia, on the left bank of the Elbe, near the mouth of the Saale, 16 miles southeast of Magdeburg (Map: German Empire, D 3). It has a normal school and a home for the blind and is the seat of a district court. The manufactures include bricks, beer, and confections. The town is well built, has a mediæval castle, and was the seat of a countship. Pop., 1900, 5137; 1905, 5301; 1910, 5292.

**BAR'CA,** or **BARCE,** bär'sē (Gk. Βάρκη, *Barkē*). An ancient city in Cyrenaica, in the district of Barca, Africa. The ruins are now known as Medinet-el-Merj. It was founded by a Cyrenean colony about 554 B.C. The Persians captured and pillaged the city about 510 B.C., and many of its people were led off as captives into Bactria. Under the Ptolemies it assumed considerable importance as a seaport.

**BAR'CA,** or **BENGAZI.** Since Oct. 18, 1912, an Italian possession, part of Libia Italiana (formerly a Turkish mutessarifat) in north Africa, situated in long. 20° to 25° E., and lat. 29° to 33° N., between Tripoli, Egypt, and the Libyan Desert, and bounded on the north by the Mediterranean Sea (Map: Africa, G 1). It has an estimated area of 20,000 square miles and a population of about 300,000, consisting mainly of Berbers, Arabs, Turks, and Greeks. It is an arid, elevated plateau, for the most part covered with sand. A range of mountains reaching in Jebel Akhdar an elevation of 3300 feet traverses the northern part from east to west. A fringe of fertile plains of red alluvium on the borders affords good arable and pasture land and contributes to the principal industries —agriculture and cattle raising. Considerable quantities of grain and cattle are exported. The sponge fisheries are also important. The chief imports are textiles and drugs. In the time of Cyrus Barca became a state which proved dangerous to the neighboring state of Cyrene, but within a century it became subject to Egypt. In the Roman period its inhabitants were noted for their predatory incursions. It was afterward a province of the Byzantine Empire and had declared itself independent when the Arabs invaded and conquered it in 641. It became part of Tripoli, later a separate province under Turkish dominion. By the Treaty of Ouchy, signed by the Turkish and Italian delegates Oct. 18, 1912, it was formally recognized as a dependency of Italy; it forms with Tripoli the new Italian colony Libya (q.v.).

**BARCA** (Sp., It. bark). A small two-masted vessel. A *barca-longa* is a large Spanish coasting vessel having pole masts and lugsails; the name is also applied to a gunboat. Both terms are used in the Philippine Islands in the senses given.

**BARCA,** or **BAR'CAS** (Gk. Βάρκας, *Barkas;* Punic, lightning, gleaming; cf. Heb. *barak,* a gleaming, or gleaming sword). A surname which was applied to Hamilcar and other Carthaginian commanders.

**BARCAROLLE,** bär'kȧ-rōl (It. *barcarolo,* boatman, from *barca,* boat). A species of song peculiar to the gondoliers of Venice. Hence the name is applied to musical compositions of a similar character, usually for voice, more rarely for instruments.

**BARCELLONA**, bär'chël-lō'nȧ. A city in Sicily, on the Longano, 27 miles west of Messina (Map: Italy, K 9). It is famous for sulphur baths that are frequented from May to September. The suburb of Pozzo di Gotto is separated from the main town by a small stream, the Fiume di Castro Reale, supposed to be the Longanus of antiquity. Oil, manna, wine, and fruit are the most important products. There are fine forests on the near-by mountains. The chief commerce is in oil and fish. Pop., 1881, 15,000; 1901 (commune), 23,493; 1911, 26,172.

**BAR'CELO'NA**, *Sp. pron.* bär'thȧ-lō'nȧ (anciently, *Colonia Faventia Julia Augusta Pia Barcino*). The capital of the province of Barcelona (formerly capital of Catalonia); after Madrid the largest city in Spain and the most important maritime, commercial, and industrial centre (Map: Spain, G 2). It is situated in lat. 41° 21′ 44″ N., long. 2° 30′ 32″ E., on the Mediterranean coast, between the mouths of the Llobrégat and the Besós, in a fertile and well-populated valley surrounded by hills, 440 miles northeast of Madrid by rail, 310 miles in a direct line. It has a pleasant and equable climate (mean temperature, 61° F.) and a good municipal water supply. Barcelona consists of the old city, formerly surrounded by walls, which have been converted into promenades, and numerous suburbs of modern architecture containing the various manufacturing establishments to which the city owes a great deal of its importance. The only fortification of Barcelona is the Castillo de Monjuich, situated on an isolated mountain near the city and provided with large magazines and extensive barracks. In the older portion of the city, bounded by the *Dondas* and the *Salons*, which mark the site of the old walls, the streets, with the exception of the wide Rambla, the Calle de Fernando VII and the Calle de la Princesa, are narrow and crooked. They are lined with houses most beautiful in design, although of somewhat gloomy coloring. The Rambla, which begins at the Columbus Monument, near the harbor, and ends at the Plaza de Cataluña, is the favorite city promenade and contains most of the theatres, hotels, and shops. On the north side of the city is situated the magnificent public park, with its fine avenues, flower beds, lakes, and several museums, including the Museo de Reproducciones, containing a fine collection of plaster casts. The cathedral of Barcelona occupies the highest point in the centre of the old city, the site formerly of a Roman temple and a Moorish mosque. It is a magnificent building of Spanish Gothic, founded in the thirteenth century, with a spacious nave, ornamented with fine reliefs. Its 26 chapels date chiefly from the sixteenth and seventeenth centuries. The church of Santa María del Mar, in late Gothic, has a fine façade decorated with bronze statues and two towers. Among other churches may be mentioned that of San Pedro de las Puellas, dating from the tenth century, and the Gothic church of Santa María del Pino.

The secular buildings of Barcelona include the old palace of the counts of Barcelona, containing the archives; the Casa de la Diputación, erected in the fifteenth century and used by the chamber of deputies for the province; and the Casa Consistorial, containing the municipal archives. Among the more modern buildings are the exchange, the custom house, and the palace of justice. Barcelona is the seat of a supreme court, a bishop, and the captain-general of Catalonia. It has a large number of nunneries and monasteries, to which are attached numerous educational and benevolent institutions. The University of Barcelona was founded in 1430 and confirmed in its establishment by Nicolas V in 1450, partly removed in 1714 to Cervera, and again established at Barcelona in 1837. It has faculties of philosophy, law, natural sciences, mathematics, medicine, and pharmacy, with a total attendance of about 1900 students. Other educational institutions of Barcelona include schools of architecture, engineering, commerce, agriculture, war, theology, pedagogy, etc. Elementary education is under the control of the municipality and is compulsory, but only in theory. The provincial and the university libraries have together over 154,000 volumes, and the general archives of the kings of Aragon number nearly 4,000,000 documents. The Palacio de Bellas Artes, situated in the park, is used for exhibitions of paintings and sculptures. Barcelona has a considerable number of theatres, among which the Gran Teatro de Liceo is the largest, with a seating capacity of 4000. There is also a bull ring, with a seating capacity of 14,500.

Barcelona is one of the largest cotton-manufacturing centres of Spain. Its other important manufactures are woolen and silk fabrics, metal articles, paper, glass, leather, and chemicals. Barcelona's commercial importance dates from the Middle Ages. The shipping, including the coast traffic, exceeds 3,000,000 tons per annum. The total commerce of the port amounts to over 750,000,000 pesetas (about $150,000,000), of which about 300,000,000 pesetas ($60,000,000) represent imports from foreign countries.

The exports consist chiefly of wine, southern fruits, and manufactures. The imports are mostly grain from Russia and the United States, cotton from the United States, hemp, metal products, and foodstuffs. Barcelona has direct communication with Germany, Morocco, Great Britain, and the West Indies. It is the seat of a United States consulate and has consular representatives from every country of importance. Municipal enterprise has improved the harbor considerably since 1880 by means of extensive moles and lighthouses.

In its administration Barcelona is the most autonomous municipality in Spain. It is governed by a council, elected by all citizens above the age of 25, who have resided not less than two years in the commune. The term of office is four years, and the council is presided over by an *alcalde*, chosen by the members from their midst. The council has charge of all the departments of municipal administration and even exercises supervision over private charitable institutions. The death rate of Barcelona is below the average for the entire country, and its sanitary conditions are improving rapidly. The city is lighted by gas and electricity, supplied by private companies. The general progress of Barcelona was accompanied by a corresponding increase of population during the last quarter of the nineteenth century. Pop., in 1887, 272,481; in 1900 (after large annexation of suburbs and manufacturing quarters), 533,000; communal *de facto* population, Dec. 31, 1910, 587,411; *de jure* population, 581,823; est. population, 1919, 582,240. Consult Montpalais, *Memorias Históricas de Barcelona* (Madrid, 1779–92).

Barcelona was founded by the Phœnicians

and is said to have derived its early name of Barcino from Hamilcar Barca, who made it one of the centres of Carthaginian power in the peninsula. An important city under the Romans, Goths, and Saracens, Barcelona in the latter half of the ninth century became an independent sovereignty, under a Christian chief of its own, whose descendants continued to govern it (being known as the counts of Barcelona) until 1137, when Catalonia, by the marriage of its prince, Raymond Berengar, with the heiress to the crown of Aragon, became a part of that kingdom. During the Middle Ages Barcelona became a flourishing seaport, rivaled in the Mediterranean by Genoa only. To its commercial code, framed in the thirteenth century, much deference was paid by the whole of Europe. In 1640 Barcelona revolted from Philip IV, but in spite of the support of the French arms it was forced to resume its allegiance in 1652. In 1705 the fortress of Monjuich was surprised and captured by Lord Peterborough, and the city surrendered shortly afterward. In 1714, after a most heroic defense, it was stormed by the Duke of Berwick and given over to fire and sword. The French held it from 1808 to 1814. During the nineteenth century Barcelona took an active share in the political dissensions of the Spanish nation. It was the centre both of reactionary and radical agitations, and the scene of socialist and Carlist uprisings. It is here that modern Spanish anarchism has its nursery; strikes and riots are frequent within the town, and in Barcelona there is to be found much republican sentiment.

**BARCELONA.** The capital of the state of Barcelona, Venezuela, on the Neveri River, 3 miles from the Atlantic coast and 150 miles east of Caracas (Map: Venezuela, E 1). It is connected with the port of Guanta by a railroad. The city is at the northern limits of the fertile llanos and is regularly laid out, but is rather poorly built and unhealthful. Among prominent buildings are the government house, the Masonic Temple, a theatre, a market, hospitals, churches, and educational institutions. The city has coal and salt mines in the vicinity and is the seat of an extensive commerce in cotton, rope, and rum. Barcelona was settled in 1638 at the foot of the Cerro Santo, but in 1671 the settlement was removed to the present site of the city. It was the capital of the former state of Barcelona until 1881, when it became the capital of the state of Bermúdez, which was subsequently divided into the states of Barcelona and Sucre. The city formerly had a much larger population, which decreased considerably because its industry and trade suffered severely in the War of Independence. There is still considerable export of sugar, coffee, and tropical products. Pop., 1891, 12,785; 1899, about 9000; 1905 (est.), 13,000.

**BAR'CLAY,** Alexander (c.1475–1552). A poet and satirist. He was born about 1475, but whether in England or Scotland is not certain. He studied at one or both of the English universities and then obtained, through his patron, Bishop Cornish, an appointment as priest in the college of St. Mary Ottery in Devonshire. He afterward became a monk of the Benedictine Monastery of Ely, where he remained until its suppression in 1539. He died in June, 1552, six weeks after he had been presented to the rectory of All-Hallows, London. His claim to notice rests chiefly upon his famous poem, *The Shyp of Folys of the Worlde*—partly a translation, and partly an imitation, of the German *Narrenschiff*, originally by Sebastian Brandt—reprinted by Pynson in 1509 and since often reprinted. Barclay, however, knew nothing of the original, but founded his translation on a Latin version by Jacob Locher, entitled *Stultifera Navis*. The poem is interesting as showing the manners and customs of the times satirized. He published several works besides; among others, *The Myrrour of Good Maners*, *The Castell of Laboure*, *The Egloges*, the first eclogues that appeared in the English language; and also made a translation of Sallust's *History of the Jugurthine War*. In his lifetime he was admired for his wit and eloquence, and his writings exhibit a refinement not common in that age. Consult Barclay, ed. Jamieson, *The Shyp of Folys* (Edinburgh, 1874), and Hannay, *Satire and Satirists* (1854). See English Literature; Satire.

**BARCLAY,** John (1582–1621). A Scottish poet and satirist. He was born Jan. 28, 1582, at Pont-à-Mousson, in Lorraine, where his father, William Barclay, a Scotchman, was professor of civil law. His mother was a Frenchwoman, but Barclay always considered himself a Scotchman. It has been said that he was educated by the Jesuits, who tried to induce him to enter their order. Whether this is so or not, he had great antipathy to them. On the accession of James to the English throne (1603), Barclay came to London, where he published the first part of the *Satyricon*, a politico-satirical romance chiefly directed against the Jesuits and the Duke of Lorraine. In 1607 a second part appeared in Paris. This was followed by the *Apologia* (1611) and *Icon Animorum* (1614), which may be regarded as further continuations of the *Satyricon*. In the meantime Barclay had published a collection of graceful Latin poems bearing the title *Sylvæ* (1606). In 1615 he left England and went to Rome, where he died Aug. 15, 1621. In the same year his best-known work, the *Argenis*, appeared posthumously in Paris. It was written in Latin and has been translated into several languages. There are no fewer than three translations into English; the last appeared in 1772. It is a political allegory, containing clever allusions to the state of Europe, more particularly of France, during the time of the League. *Argenis* was admired by Cowper and Coleridge. Consult Dukas, *Etude bibliographique et littéraire sur le Satyrikon* (Paris, 1880). See English Literature; Satire.

**BARCLAY,** John (1734–98). A Scottish divine, the founder of a sect in the Scottish church called Barclayites, or Bereans—a name derived from the Acts of the Apostles, xvii. 2. He was assistant minister at Fettercairn, where he attracted crowds by his novel doctrines, but the Presbytery dismissed him from his position. The General Assembly sustained the Presbytery, whereupon Barclay left the church, but continued to preach in Edinburgh, London, and other cities. (See Bereans.) He published many tracts and pamphlets. One of the more important of his longer treatises is *Without Faith, Without God; or an Appeal to God Concerning His Own Existence* (1769). His *Works* were published with a memoir (1852).

**BARCLAY,** John (1758–1826). A Scottish anatomist. He prepared for the ministry, but became interested in natural science and devoted his life to the study of anatomy. He published, in 1803, *A New Anatomical Nomenclature*, and

in 1808 a treatise on the muscular motions of the human body. In 1812 appeared his *description of the Arteries of the Human Body*, a work of vast labor and accurate observation. In 1822 he published *An Inquiry into the Opinions, Ancient and Modern, Concerning Life and Organization.* He left to the Royal College of Surgeons in Edinburgh his admirable anatomical collection, for which a suitable hall was erected and named the "Barclayan Museum." Consult Waterhouse's "Memoir" in *Jardine's Naturalist's Library*, vol. viii (Edinburgh, 1843).

**BARCLAY,** ROBERT (1648–90). The celebrated apologist of the Quakers. He was born on Dec. 23, 1648, at Gordonstown, in Morayshire, Scotland. His father was the son of David Barclay, of Mathers, the representative of an old Scoto-Norman family; his mother was the daughter of Sir Robert Gordon, the premier baronet of Nova Scotia and historian of the house of Sutherland. Young Barclay received the rudiments of learning in his native country and was afterward sent to the Scotch College at Paris, of which his uncle was rector. Here he made rapid progress in his studies and excited the admiration of his preceptors as well as of his relative, who offered to make him his heir if he would remain in France and formally adopt the Roman Catholic religion, to the ceremonies of which he had been habituated during his residence there. This, however, Barclay refused to do and returned home in 1664. Though only 16, Barclay was an excellent scholar and could speak Latin with wonderful fluency and correctness. In 1666 his father became a Friend, and the next year Barclay followed him. He states in his *Treatise on Universal Love*, that his "first education fell among the strictest sort of Calvinists," those of his country "surpassing in the heat of zeal not only Geneva, from whence they derive their pedigree, but all the other so-called Reformed Churches"; that shortly afterward his transition to France had thrown him among the opposite "sect of Papists," whom after a time he found to be no less deficient in charity than the other; and that consequently he had refrained from joining any, though he had listened to several. The ultimate effect of this was to liberalize his mind by convincing him of the folly and wickedness of religious strife. In both Calvinists and Catholics he found an absence of "the principles of love," "a straitness of doctrine," and a "practice of persecution" which offended his idea of Christianity as well as his gentle and generous nature. He therefore allied himself gladly to the Friends, whose distinguishing feature was their charity and pure simplicity of Christian life, and soon became one of their most devoted adherents and their ablest advocate. In the course of his life he made several excursions into England, Holland, and Germany, earnestly propagating his peaceful views wherever he went and occasionally enjoying the companionship of William Penn.

His first publication was *Truth Cleared of Calumnies.* It appeared in 1670 and was intended as a refutation of the charges—many of them notoriously false—made against the new sect. In 1673 appeared *A Catechism and Confession of Faith*, the answers to the questions being, to avoid theological dogmatism, in the words of Scripture. This was followed by *The Anarchy of the Ranters* in 1676, and the same year he published in Latin his greatest work. In 1678 he published it in English, under the title *An Apology for the True Christian Divinity, as the same is Held forth and Preached by the People called in Scorn Quakers.* It contains a statement and defense of 15 religious propositions peculiar to the Friends. The leading doctrine which runs through the whole book is, that divine truth is made known to us not by logical investigation, but by intuition or immediate revelation; and that the faculty, if it can be technically defined, by which such intuition is rendered possible, is the "internal light," the source of which is God, or, more properly, Christ, "who is the light that lighteth every man that cometh into the world." In 1677 appeared his *Treatise on Universal Love.* It was the first of that long series of noble and gentle remonstrances against the criminality of war that has so honorably distinguished the Society of Friends. It was addressed to the ambassadors of the several princes of Europe, met at Nimeguen, and was composed in prison at Ury, near the city of Aberdeen, where he, his father, and many other Friends were confined for their faith's sake. He was released after five months and during the latter part of his life enjoyed court favor unmolested. In 1683 the Duke of York gave the Friends the patent of the province of East Jersey, and Barclay was made nominal Governor. He never came to America, however. In 1686 he published his last work, which was a defense of the doctrine of "immediate revelation." He died at Ury, Oct. 3, 1690. His estate remained in the possession of his descendants till the death, in 1854, of Robert Barclay Allardice. "The Apologist's Study," which remained much as he left it, was long an object of pilgrimage with members of the Society of Friends; but it was destroyed a few years ago, when the old house of Ury was pulled down. Barclay's works were published in a collected edition entitled *Truth Triumphant* (London, 1692; later ed., 1717–18, 3 vols.). For his biography, consult Wilson Armistead (Manchester, 1850). His *Apology* and *Catechism* and *Treatise on Church Government* (formerly called, as above, *The Anarchy of the Ranters*) have been reprinted by the Friends' Book Store (Philadelphia).

**BARCLAY,** ROBERT H. (?–1837). A Scottish naval officer. He served at Trafalgar and in 1813 fitted out the English fleet on Lake Erie. In command of this fleet he was defeated in the battle of Lake Erie, September 10, by Commodore O. H. Perry (q.v.). During the battle he was seriously wounded. Subsequently he was tried by court-martial for the surrender of his fleet, but was acquitted.

**BARCLAY,** SIR THOMAS (1853– ). A British barrister, born at Dunfermline, Scotland. He was educated at University College, London, and at the universities of London, Paris, Bonn, and Jena. Having been sent to Paris in 1876 as correspondent of the London *Times*, he turned his attention (1882) to the study of French law practice. In 1900 he began agitation for a better understanding between England and France, in 1903 and 1904 visited the United States in the interest of an Anglo-American arbitration treaty, and in 1905 made addresses in Berlin in favor of improving British and German relations. The International Brotherhood Alliance (*Fraternitas inter gentes*) was founded by him in 1905. He was knighted in 1904, and in 1910 he became a member of Parliament. His publications include: *Companies in France* (2d ed., 1899); *The Hague Court and Vital Inter-*

*ests* (1905); *Problems of International Practice and Diplomacy* (1907); *The Turco-Italian War and its Problems* (1912).

**BARCLAY DE TOLLY,** bär-klā de tō-lē', MICHAEL, PRINCE (1761–1818). A Russian general. He was descended from an old Scottish family settled in Livonia, and entered a Russian regiment of cuirassiers with the rank of sergeant. He fought with great bravery in the Turkish War of 1788–89, in the campaign against Sweden in 1790, and in those against Poland in 1792 and 1794. In the year 1806, at Pultusk, as major general, he commanded Bennigsen's advance guard. In 1808 he distinguished himself in Finland, and in 1809 he led a force across the frozen Gulf of Bothnia to Sweden. Although hated by the Russian national party as a foreigner, he was appointed Minister of War by the Emperor Alexander in 1810, an office which he held till 1813. In 1812 he was made commander in chief of the Army of the West. His retreat to Smolensk, and the loss of the battle fought there on the 17th of August, raised the hatred of the Russian national party to a greater height than ever, and he was obliged to yield the chief command to Kutusoff. Barclay's Fabian tactics, although extremely unpopular with the mass of Russians, in the end brought about the destruction of Napoleon. At the battle of the Moskva or Borodino he commanded the right wing. After the death of Kutusoff he again rose to prominence, did brilliant service in the battle of Bautzen (1813), and was once more placed in command of the army. He afterward took part in the battles of Dresden, Culm, and Leipzig. He was made prince and field marshal. He died at Insterburg, in East Prussia.

**BARCLAY SOUND.** An inlet on the west coast of Vancouver Island, British Columbia, Canada (Map: British Columbia, D 5). It extends eastward for about 35 miles and is continued inland three-fourths of the way across the island by the narrow fiord, Alberni Canal, which drains the Great Central, Sproats, and Nahmint lakes. The northern and southern extremities of the sound are called, respectively, Cape Beale, marked by a lighthouse, and Amphitrite Point. Broken Group and several other islands are in its waters. Deposits of iron-bearing ores exist on its shores.

**BARD** (Irish *bard*, Welsh *bardd*, Cornish *bardh*, Breton *barz*). A name commonly given to poets and singers among the Celtic peoples, and mentioned by classical historians as early as the second century B.C. But they disappeared early among the Gauls of the Continent, being replaced in ancient Ireland by the satirical or panegyrical poets called *filid*. Among the insular Celts they formed an important social class throughout the Middle Ages, and under modified conditions, the order exists to this day.

According to Strabo (*Geography*, vol. iv, pp. 4, 5), there were among the primitive Celts three classes of men who were the objects of extraordinary honors: the bards, the ovates, and the druids. The meagre information that we possess concerning the primitive bards permits us to believe that they were national poets or minstrels, and that they used the *chrotta*, a kind of harp.

In the old Welsh laws bards were recognized as important members of the community, with special rights and duties. They were organized in some fashion into a separate order, and it is traditionally believed that Gruffydd ap Kynan, King of Gwynedd, made rules for their government. But on this last point there is no satisfactory proof. It should be also said that there is no evidence at all for the claim that the bardic organization of the twelfth century was a survival of the ancient Druidic hierarchy. Mr. Stephens, in his *Literature of the Kymry*, has made it clear that the Druidism of the Middle Ages was confined to the bards and was of very recent origin; and the Druidism of the modern *Gorsedd* appears to be a later development still. The writings of the Welsh bards, which dealt with a large variety of subjects, both secular and religious, are treated elsewhere in the article on WELSH LANGUAGE AND LITERATURE. The order of bards is still regularly maintained in Wales in connection with the Druids and ovates. From year to year, reunions (called *Eisteddfodau*, from *eisted*, 'to sit') are held, in which those who win certain prizes are granted a bardic name. Many of these are known by their fellow countrymen by no other title.

In Ireland the rank and privileges of poets were not dissimilar to those established in Wales. But the name *bard* was at first applied in Irish only to the lower order of popular rhymesters, while the poets of the schools were known as *filid* (singular, *fili*). This distinction disappeared, however, in the course of time, and the name *bard* came to be applied to all poets in Ireland as it was in Wales. Professional bardic schools were maintained down through the seventeenth century, and the old classical metres were taught in them to the end. (See IRISH LITERATURE.) But English rule was always unfavorable to the bards, and they practically disappeared in the course of the eighteenth century.

In Scotland, the name *bard* has been applied freely to poets down to the present time, but there does not appear to have been any regular bardic organization in the modern period.

**Bibliography.** Classical citations are brought together in Holder's *Altceltischer Sprachschatz* (Leipzig, 1896). Consult also for the bards of the Gauls: Dottin, *Manuel de l'antiquité celtique* (Paris, 1906); D'Arbois de Jubainville, *Cours de littérature celtique*, vol. i (Paris, 1883); *Les Druides et les dieux celtiques à forme d'animaux* (Paris, 1906). For the Welsh bards: Walter, *Das alte Wales* (Bonn, 1859); Stephens, *Literature of the Kymry* (London, 1873). For the Irish bards: Thurneysen, *Mittelirischen Verslehren*, in Stokes and Windisch's *Irische Texte*, vol. iii (Leipzig, 1880–1900); Douglas Hyde, *A Literary History of Ireland* (New York, 1906); Hull, *Irish Literature*, vol. ii (*London*, 1908). Among older treatises, Jones, *Relics of the Welsh Bards* (London, 1784), and Walker, *Memoirs of the Irish Bards* (London, 1786), may be cited.

**BARD,** or **BARDING** (Sp., Port. *albarda*, pack saddle, from Ar. *al-barda'ah*, a wooden pad placed under the saddle). The armor used for the protection of a horse; almost always used in the plural, bards or bardings. See CHAMFRON.

**BARD.** A village in north Italy, on the Dora Baltea River and the Turin-Aosta Railway, 51 miles north of Turin (Map: Italy, B 2). Near it and over the railway tunnel, at a height of nearly 1300 feet, towers Fort Bard, which commands the road over the Great and Little St. Bernard into the plains of Piedmont. It was built in the eleventh century, was seized by the French during the War of the Spanish Succession in 1704, and in 1800 was destroyed by them

after it had been defended by 400 Austrians who held Napoleon in check for a week before the battle of Marengo; it was afterward rebuilt. Pop. (commune), 1881, 437; 1901, 425; 1911, 390.

**BARD,** SAMUEL (1742–1821). An American physician. He was born in Philadelphia and was educated at Columbia College and the Edinburgh Medical School. He organized the medical school at Columbia College and became dean of the faculty. While New York was the seat of the Federal government, he was Washington's family physician. In 1813 he became president of the College of Physicians and Surgeons in New York. His published works comprise a study of the diseases of sheep, *The Shepherd's Guide* (1807); a treatise on *Angina Suffocativa*, and a *Manual of Midwifery* (1807). Consult John McVickor, *Life of Samuel Bard* (New York, 1822).

**BARDAISAN,** bär'dī-sān'. See BARDESANES.

**BARDEEN,** CHARLES WILLIAM (1847– ). An American educator and editor, born at Groton, Mass., and a graduate of Yale University in the class of 1869. For three years before entering college he served in the Civil War, with the First Massachusetts Volunteers. After filling several less important educational positions, he was made (1872) superintendent of schools at Whitehall, N. Y. Two years later he became editor and publisher of the *School Bulletin* and continued as such for many years. Identifying himself prominently with a number of educational and scientific societies, he held for six years (1900–06) the presidency of the Educational Press Association of America. His publications, dealing mainly with subjects related to his profession, include: *Manual of School Law* (1875); *Some Facts about our Public School System* (1878); *Teaching as a Business for Men* (1885); *Organization and System Versus Originality* (1890); *The Song Budget Series Combined* (1894); *Geography of the Empire State* (1895); *Some Problems of City School Management* (1899); *Dictionary of Educational Biography* (1901); *The Woman Trustee* (1905); *Educational Journalism for the Past Fifty Years* (1906); *Fables for Teachers* (1909); *Tom and Tom Tit* (1911); *The Yellow Streak, and Other Stories about Schools* (1912).

**BARDELEBEN,** bär'dē-lā'bĕn, ADOLF VON (1819–95). A German surgeon, born at Frankfort-on-the-Oder. He studied medicine in Germany and in France and in 1849 became professor of surgery at the University of Greifswald. During the War of 1866 he acted as surgeon general and in 1868 became professor of surgery in the University of Berlin. In 1870 he again acted as consulting military surgeon. His published works include an excellent *Lehrbuch der Chirurgie und Operationslehre* (1852; 8th ed., 4 vols., 1879–82).

**BARDELL',** MRS. A widow in Dickens's *Pickwick Papers*. She is plaintiff in the famous case of Bardell *v.* Pickwick. After the trial she is thrown into the Fleet Prison for inability to pay her lawyer's fees. See DODSON AND FOGG.

**BARDESANES,** bär'dē-sā'nēz, or **BARDAISAN** (son of Daisan, a river) (154–c.223). A Syrian Christian poet and theologian. He was born at Edessa, of a good family, and lived for a time at the court of the Abgars. Our information concerning him is not extensive, and only fragments of his many writings have survived, but we know that he was a very influential figure in the Syrian church. He died at Edessa c.223. It was chiefly through his efforts that Christianity was first introduced into Edessa, which soon became an important theological centre. He fled into Armenia when Edessa was taken by Caracalla (217), but returned soon afterward. Writers like Eusebius and Jerome refer to Bardesanes in high terms, although the former represents him as having been for a time a Valentinian Gnostic. See VALENTINUS; GNOSTICISM. He popularized his views in the form of hymns, 150 in number, which were widely used and which justify us in regarding Bardesanes as one of the fathers of Christian hymnology. It is uncertain how much his son, Harmonius, contributed toward this enrichment of worship, but some ancient authorities rate his services very high. Ephraim, the Syrian, an orthodox writer of the fourth century, was alarmed at the influence these hymns still exerted in his day, so he composed others in their place, using Bardesanes as a model, but inserting nothing that was not strictly Catholic. It is difficult to decide just how far Bardesanes' teachings diverged from orthodoxy. He himself denied the charge of polytheism which was brought against him.

The book of *Laws of Countries—Cureton, Spicilegium Syriacum* (London, 1855), and the *Ante-Nicene Fathers*, vol. viii, pp. 723 ff. (New York, 1895)—is not the work of Bardesanes, as some have thought, but comes from one of his school and reflects his views. For the early references to Bardesanes consult Harnack, *Geschichte der altchristlichen Litteratur*, vol. i (Leipzig, 1893); for monographs on Bardesanes (in German), Hahn (1819), Merx (1863), and Hilgenfeld (1864). Consult in general, Hort, "Bardaisan," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887).

**BARDI,** bär'dē, BARDO DE'. A blind scholar in George Eliot's novel, *Romola*. He is the father of the heroine.

**BARD OF A'VON.** A frequent title of Shakespeare, from his home at Stratford-on-Avon.

**BAR'DOLPH.** One of Falstaff's followers in Shakespeare's *Henry IV*, *Henry V*, and *The Merry Wives of Windsor*. He is, first, corporal, then lieutenant in his leader's "ragged regiment," everywhere conspicuous for his red nose.

**BARDOUX,** bär'dōō', AGÉNOR, pen name Agénor Brady (1830–97). A French politician and author, born at Clermont-Ferrand. He studied law in Paris and in 1871 was elected to the National Assembly. In 1876 he was elected to the Chamber of Deputies and from 1877 to 1879 was Minister of Public Instruction. He was elected a permanent Senator in 1882. He wrote *Les légistes et leur influence sur la société française* (1877), *Le comte de Montlosier et le gallicanisme* (1881), *La bourgeoisie française* (1886), *Chateaubriand* (1893), and *Guizot* (1894).

**BARDOWIEK,** bär'dō-vēk. A town in the province of Hanover, Prussia, on the Ilmenau River, 3 miles north of Lüneburg. In 1189, when it was destroyed by Henri the Lion, it ranked as the principal commercial centre of north Germany. The region is fertile, and Bardowiek is a centre for trade in farm products. Ruins of a cathedral of splendid proportions exist, incorporated with a fourteenth-century Gothic church. Pop., 1900, 2002; 1910, 2200.

**BARD'SEN,** IVAR (c.1300–c.1350). A Greenland magistrate. He was born in Oster Bygd,

or the East District of Greenland, and held the position of steward under the Bishop of Gardar. In 1339 he was sent with several vessels to relieve the sister colony of Vester Bygd, or the West District, which had been invaded by the Eskimos. The manuscript of his account of this expedition, with sailing directions, was found many years later in the archives at Copenhagen and was subsequently translated into various languages. The first English translation seems to have been made for Henry Hudson. Danish, Latin, and English versions may be found in Major's *Voyages of the Venetian Brothers, N. and A. Zeno* (1873), and an English version, with the original text, was published by the Hakluyt Society in 1873. Consult B. F. De Costa, *Sailing Directions of Henry Hudson, Prepared for his Use in 1608 from the Old Danish of Ivar Bardsen* (Albany, 1869).

**BARDSTOWN.** A city, and the county-seat of Nelson Co., Ky., 39 miles by rail south by east of Louisville, on the Louisville and Nashville Railroad (Map: Kentucky, E 4). It contains the St. Joseph's College (Roman Catholic) and Bethlehem Academy. The city is a shipping point for hogs, cattle, grain, and whisky, and has distilleries, flouring and saw mills, and cooperage, and manufactures chairs, brooms, and concrete. The water works and light plant are owned and operated by the city. Pop., 1900, 1711; 1910, 2126.

**BARDWAN,** bûrd-wän′ (Pers. formerly *Wardhamana*, the thriving, growing one). A city on the Damoda River, in the district and division of Bardwan, Bengal, British India, on the Grand Trunk Railroad from the Hugli to the northwest, in lat. 23° 12′ N. and long. 87° 56′ E., 74 miles from Calcutta (Map: India, E 4). It is a miserable place—an aggregate of second-rate suburbs—but contains numerous temples and a large palace. Pop., 34,500. The division of Bardwan has an area of 13,850 square miles. Pop., 1891, 7,689,300; 1901, 8,245,000.

**BARE,** bä′rā. An important group of tribes of Arawakan stock, occupying the upper Rio Negro in northwestern Brazil and the Casiquiare, Guainia, and Atabapo in the adjacent region of Venezuela. They are said to be absorbing the neighboring tribes, so that within the last century their language has become general throughout a wide area. Their centre is still the settlement of San Carlos, and according to Dr. Koch-Grünberg (1911) "they form the nucleus of the modern civilized Indian population of the greater part of the Rio Negro."

**BAREA,** bä′rā-ä (Abyss. slaves). The name of a negro tribe living in the mountains north of Abyssinia. They have suffered greatly from the continual raids of slave traders and are now much reduced in number. An account of this people is given in Munzinger's *Ostafrikanische Studien* (Schaffhausen, 1864), and a grammar of their language was published (Vienna, 1874) by Reinisch, who utilized Munzinger's manuscript collections. See AFRICAN LANGUAGES.

**BARE'BONES,** or **BARBON,** PRAISE-GOD (c.1596–1679). A London tanner, and member of the Parliament of 1653, who became known by his name. In 1660 he headed a procession of people to protest against the restoration of Charles II, and in consequence spent some time in the Tower in 1662. He had been chosen minister of a Baptist congregation shortly after 1630 and became very popular as a preacher.

**BAREBONES PARLIAMENT.** A name in derision applied to Cromwell's "Assembly of Nominees," from one of its members, the tanner, Praise-God Barebones. This Parliament was composed of 140 members selected by the general-in-chief and the council of the army from lists of nominees submitted by the Congregational churches in each county. It met on July 4, 1653; and Cromwell, in a long speech, impressed upon its members their responsibility as godly men. It was expected, apparently, to perform the functions of a kind of constituent convention, preparing the way for the election of a regular parliament into whose hands it was to resign its authority. Much ridicule has been cast upon it for its alleged unpractical character. Its attempt to abolish tithes and the Court of Chancery, without providing proper substitutes, has been especially criticised. As a matter of fact, it was a very respectable body, containing many able men. Several very wise measures were enacted. Among these was an ordinance providing for the civil-marriage celebration before justices of the peace and for civil-marriage registration by elected parish registrars. Its provisions were in harmony with the contemporary laws of the New England Colonies and anticipated the essential principles of the present English system by nearly 200 years. But the Assembly attempted constitutional legislation which Cromwell regarded as beyond its province; and so, on Dec. 12, 1653, the majority of its members placed their resignation in his hands. Consult: H. A. Glass, *The Barebone Parliament* (London, 1899); C. H. Fisch, *Oliver Cromwell* (New York and London, 1900); Gardiner, *History of the Commonwealth and Protectorate*, vol. ii (New York, 1903); Trevelyan, *England under the Stuarts* (London, 1904).

**BARE'FOOT'ED** (in Lat. *discalceati*, shoeless). An appellation given to certain monks and nuns who abstain from wearing any covering on the feet, either entirely (as the Alcantarines, who originated at Placentia, in Spain, in 1540), or for a specified period of the year (as the nuns of Our Lady of Calvary); or who, instead of shoes, wear merely sandals, i.e., soles of wood, leather, rope, or straw fastened by thongs. They do not constitute a separate order in the Roman Catholic church, but are to be found as representing a higher grade of asceticism with more or less severity of observance, among most of the orders, Carmelites, Franciscans, Augustines, Eremites, Capuchins, etc. This form of religious austerity is to be traced generally to the custom which prevailed among the Jews and Romans of putting off their shoes on the occurrence of public calamities, that in this condition of mourning and humiliation they might implore the Divine Being for deliverance; but perhaps more particularly to the command which Christ gave his disciples (Matt. x. 10; Luke x. 4).

**BARÈGE,** bȧ′rāzh′. A fabric of mixed yarns, gauze-like in texture, adapted for women's dresses, called in France *crêpe-de-barège*. The name is derived from the valley of Barèges, where they were first manufactured, the seat of the manufacture at present being at Bagnères de Bigorre. Barèges are usually a mixture of silk and worsted; an inferior kind being composed of cotton and worsted. They vary in color and are sometimes light in tint, with printed patterns. All are of light weight for summer wear. The best are manufactured in France.

**BARÈGES, or BARÈGES-AUX-BAINS,** ȯ′bāN′. A watering place in the department of

Hautes-Pyrénées, France, picturesquely situated in the valley of the river Bastan, 4000 feet above sea level, 24 miles south of Tarbes. It consists of a single street of some 80 houses, running along the narrow, rugged glen. The springs are considered efficacious for rheumatism, scrofula, and old wounds. The bath establishment is a fine marble building. Other prominent institutions are the Military Hospital and the Ecclesiastical Charity Hospital of Sainte Eugénie. Extreme cold and the danger of frequent avalanches almost depopulate the town in winter.

**BAREILLY**, bâ-rā'lē, or **BARELI**. The capital of the Bareli district in the Rohilkhund division of the United Provinces, British India (Map: India, C 3). It is in lat. 28° 23′ N., and long. 79° 28′ E., 152 miles east of Delhi. It is pleasantly situated in a well-wooded country on the left bank of the Juā, an affluent of the Ramgdanga, but possesses few structures of architectural beauty. Besides a brisk and lucrative commerce in grain, cotton, and sugar, the octroi on which is the chief source of municipal revenue, it has considerable manufactures, more particularly of ornamental chairs and tables. It is the seat of a well-attended government college and has a military cantonment. Bareilly became notorious during the mutiny of 1857 by the massacre of Europeans on the 31st of May. It was recaptured by Sir Colin Campbell, afterward Lord Clyde, in May, 1858. Pop., 1891, 121,000; 1901, 117,400; 1911, 129,462.

**BARENTS**, bā'rents, Willem (?–1597). A Dutch explorer of the Arctic Ocean. He sailed from Holland in June, 1594, to find a northeast route to China, and explored a great part of Nova Zembla. In May, 1596, he went as pilot of two ships sent out by the city of Amsterdam. At Spitzbergen the ships separated, and Barents guided one of them around Nova Zembla. At Ice Haven it was frozen in, and here Barents and his companions were forced to remain for months, suffering terribly from the intense cold. Many of the crew died in the course of the winter. On June 14, 1597, the survivors started in open boats for the mainland. Barents and four of his companions soon succumbed, but the rest reached Lapland, where they found the other vessel and were rescued. Interesting relics of this expedition were discovered in 1871 by Captain Carlsen; they were found undisturbed after a lapse of 274 years. Consult Gerrit de Veer, *The Three Voyages of Willem Barents*, published by the Hakluyt Society (London, 1876).

**BARÈRE DE VIEUZAC**, bà'rār' de vyē'zàk', Bertrand (1755–1841). A member of the French National Convention. He was born at Tarbes and practiced law at Toulouse. After acting as deputy in the States-General and editing a daily Revolutionary paper, *Le Point du Jour*, he was sent, in 1792, to the National Convention by the department of Hautes-Pyrénées. His eloquence was so poetical that he came to be known as "the Anacreon of the guillotine." He was reporter from the committee on war, where he sat with Danton, and presided over the convention when sentence was passed on Louis XVI, rejecting the King's appeal to the people, with the words, "The law is for death, and I am here only as the organ of the law." His inborn mildness warring with the instinct of self-preservation made him alternately a supporter of merciful measures and a bloodthirsty advocate of the guillotine; but his entire public career indicates a man of essential cowardice, far more selfish than patriotic. After the fall of Robespierre, whom he helped to overthrow, Barère proposed the continuation of the Revolutionary Tribunal, but was denounced, impeached, and sentenced to transportation. He was saved, however, by the general amnesty after the 18th Brumaire. Elected as deputy during the Hundred Days, he was banished after the second Restoration, and devoted himself to literary work at Brussels, till the Revolution of July permitted his return. In 1832 he was once more elected as a deputy from the Hautes-Pyrénées. His election, however, was annulled on account of errors in form, whereupon the government gave him an official position in his department, which he held till 1840. His *Mémoires*, which were published at Paris in 1834, have been translated into English by Payne (London, 1896).

**BARETTA-WORMS**, bà'rĕ'tà' vōrms', Blanche Rose Marie Hélène (1856– ). A French actress, member of the Comédie Française. She was born at Avignon and entered the Conservatoire when only 12 years old, leaving it in 1872 with a second prize in comedy. After engagements at the Odéon and the Vaudeville she made her début at the Théâtre Français in 1875, as Henriette in *Les femmes savantes*, and the next year became a member of the company. Among her successes there have been her performances in *Le mariage de Victorine*, *La maîtresse légitime*, *Le fils naturel*, *Les corbeaux*, *Antigone*, *Le gendre de Monsieur Poirier*, and *Le jeu de l'amour et du hasard*. She was married to M. Worms, a colleague at the Théâtre, in 1883.

**BARETTI**, bà-rĕt'tē, Giuseppe Marc' Antonio (1719–89). The most important Italian critic of the eighteenth century, well known in England for his friendship with Reynolds, Burke, and Dr. Johnson and for his English works. After a roving life through the literary centres of Italy, he settled as a teacher of Italian in London (1751) and gave impetus to Italian studies by his many friendships and by his *Dissertation on Italian Poetry* (1753), his *Italian Library* (1757), and by his Italian grammar and dictionary (1753, 1760). In 1760 he returned to Italy as a private tutor, leaving a charming narrative of the journey in his *Lettere familiari*, published also in English, *A Journey from London to Genoa* (1770). In Venice (1763–64) he edited, under the pseudonym of Aristarco Scannabue, the *Frusta letteraria*, or 'Literary Scourge,' his most serious work, in which he attempted to thrash Italian letters into more serious channels. Again, in England in 1765, he published an *Account of the Manners and Customs of Italy*, and a *Discours sur Shakespeare et M. de Voltaire* (1777), in which he warmly defended the English dramatist. Soon after his return he killed a man in a street brawl, was tried for murder, and acquitted. In his later years, which he passed almost entirely in England, he acted as secretary of the Royal Academy and at one time rejected a professorship at Oxford. As a critic, Baretti stimulated the mutual understanding between England and Italy. He was singularly free from many of the cant prejudices of his contemporaries in Italy, especially in regard to academic literature. His literary taste in many of its aspects was a century ahead of his time. Yet his work is more of impulse, with moments of inspiration, than of profound penetration into the underlying principles of criticism. Consult L. Colli-

son-Morley, *G. Baretti with an Account of his Literary Friendships* (London, 1909), and B. Croce, *Problemi di estetica* (Bari, 1910). Selected works were published at Bari (1911 and afterward), edited by L. Piccioni, the leading authority on Baretti's life and works.

**BARFLEUR**, bär'flēr' (projection on the channel, from Gael. *barr*, Scand. *bard*, projection, summit + Teut. *fleot*, *fliez*, flush of water, canal, Ger. *Fliess*, Dutch *vliet*, AS. *fleót* = Eng. fleet, a river). A seaport and summer resort in the department of La Manche, France, 16 miles east of Cherbourg (Map: France, N., D 3). There is good sea bathing, and some trade in timber and fish. Up to the time of Henry IV of England it was strongly fortified and a port of arrival from England. Pop., 1901, 1210; 1906, 1274; 1911, 1238.

**BARFOD**, bär'fôd, PAUL FREDERIK (1811–96). A Danish historian, born at Lyngby (Jutland). In 1848–49 he was a member of the Constitutional Assembly, subsequently also of the Folkething, and an official in the Ministry of the Interior. In 1866 he became an assistant in the Royal Library at Copenhagen. He was an advocate of Scandinavian unity. His principal work is *Fortœllinger af Fœdrelandets Historie*, 'Tales from the History of the Fatherland' (4th ed., 1874).

**BARFURUSH**, bär'fu-rōōsh'. See BALFRUSH.

**BARFUSS**, bär'fōōs, HANS ALBRECHT, COUNT (1635–1704). A Prussian field marshal, born at Mögelin (Brandenburg). He first became prominent in 1678 as a colonel in the war against Sweden, and in the war against the Turks won much distinction as commander of the left wing at the storming of Buda in 1686. With an auxiliary force of 6000 he took a prominent part in the victory over the Turks at Slankamen (1691). Subsequently he was active in various cabals of the court, until expelled through the influence of his rival Von Wartenberg.

**BAR'GAIN** (OF. *bargaigner*, to chaffer, LL. *barcaniare*, to traffic, change about, from *barca*, bark, boat for traffic) **AND SALE**. A mode of conveying lands at common law, owing its efficacy to the Statute of Uses (q.v.). Technically the transaction was a bargain, or agreement, on the part of the vendor (hence called the *bargainor*), which amounted to a declaration of trust in favor of the purchaser (known as the *bargainee*), and which, being a "dry" or passive trust, was thereupon executed by the force of the statute, transferring the title of the property from the former to the latter. It was essential to the efficacy of a bargain and sale that it should be based upon a valuable consideration, in order that it should operate to create a trust or to transfer the legal title to the lands affected thereby. The correlative transaction, where such a bargain or declaration of trust was made without a material consideration to a blood relation of the vendor, was known as a *covenant to stand seised* to the use of the latter. This was said to be based on the consideration of blood and affection, and was described as a "good," as distinguished from a "valuable" consideration. It is to the prevalence of these forms of conveyance—which were by no means the only methods by which lands could be conveyed—that we owe the general but erroneous belief that a conveyance of lands not made to a relative of the grantor always requires a valuable consideration. The ancient conveyance by feoffment or livery of seisin (qq.v.) was effective without an actual or pretended consideration, and there is no sufficient reason to doubt that this is equally true of the modern conveyance by grant (q.v.). The caution of lawyers, however, has kept alive the practice of reciting a consideration in deeds of all kinds. In order to avoid the registration of a deed of bargain and sale required by the Statute of Enrollments (27 Hen. VIII, c. 16, 1535), the modern deed of *Lease and Release* was invented, which was in effect a bargain and sale of the lands to be conveyed, for a year, followed by a release (q.v.), or quitclaim (q.v.), by the vendor of his reversionary estate as landlord. In this form the conveyance by bargain and sale was the usual mode of transferring the title to lands in England for 300 years, and in the United States until the enactment of statutes during the last century substituting the more direct and convenient deeds of grant now generally in use. Deeds of bargain and sale and of lease and release, though infrequent and no longer necessary, may still be used. Consult: Blackstone, *Commentaries on the Laws of England;* Williams, *Principles of the Law of Real Property*, 17th International ed. (London, 1892; Boston, 1894); Tiffany, *The Law of Real Property* (St. Paul, 1903).

**BARGE'BOARD** (cf. LL. *bargus*, a sort of gallows). In wooden domestic architecture in England, and later in Switzerland, when the roof projects considerably over the wall of a house, the gable is generally furnished along its edge with a board which either covers a rafter or occupies the place of a rafter itself. These bargeboards were often very richly ornamented, particularly in the fourteenth and fifteenth centuries. They are sometimes termed *Vergeboards.*

**BARGÈS**, bär'zhĕs', JEAN JOSEPH LÉANDRE (1810–96). A French Orientalist. He was born at Auriol (Bouches-du-Rhône) and was educated at Marseilles. He was ordained to the priesthood in 1834 and three years afterward was appointed to the chair of Arabic at Marseilles. In 1842 he became professor of Oriental languages at the Faculty of Theology at Paris, which position he occupied until the suppression of that faculty in 1885. Among his numerous publications are the following: *Temple de Baal à Marseille, ou Grande inscription phénicienne*, etc. (1847); *Aperçu historique sur l'Église épiscopale de Tlemcen* (1848); *Hébron et le tombeau du patriarche Abraham* (1865); *Vie du célèbre marabout Cidi Abou Medien* (1884); *Recherches archéologiques sur les colonies phéniciennes établies sur le littoral de la Celto-Ligurie* (1878); *Notre-Dame des victoires pendant la Commune* (1889).

**BAR'GHEST**. A horrible goblin, with large teeth and claws, fabled to appear in the form of a huge dog or bear. Its appearance to any one is taken to portend imminent death or grievous misfortune. The barghest is still fancied to exist in the northern part of England. As to the origin of the name, opinions differ widely. The latter part, *ghest*, would seem to be identical with the German *Geist*, English *ghost*. Some think that "barghest" is for *berg-geist*, 'mountain demon'; others refer it to *Bär*, 'bear,' in allusion to its supposed form.

**BARGIEL**, bär'gēl, WOLDEMAR (1828–97). A German composer and teacher of music. He was born and died in Berlin. He studied music in Leipzig under Moscheles, Hauptmann, and Gade,

and in 1850 began to teach in Berlin, where he made a reputation by publishing pianoforte and orchestral works. In 1859 he was made professor at the Conservatory of Cologne; in 1865 kapellmeister and director of music in Rotterdam, and in 1874 became professor in the Hochschule für Musik in Berlin. Bergiel was a devoted follower of Schumann (he was a stepbrother of Clara Schumann), and his works, though not numerous, are highly esteemed. He is best known by his overtures to *Medea* and *Prometheus*, and by his two choruses for female voices, *Spring Night* and the *VIII Psalm*. Consult J. A. Fuller-Maitland, *Masters of German Music* (London, 1894).

**BARHA'DAD I.** King of Damascus, son of Tabrimmon. He reigned c.885–844 B.C. He was the ally of Asa of Judah (c.933–877) against Israel, and he fought against Ahab (c.872–851) with varying success. On the other hand he seems to have been able to cope with Shalmaneser III (860–825), both at Karkar in 854 and in 849–848. The Assyrian inscriptions refer to him as IM-'idri, which may be read either Biridri or Adad-idri, and the Hebrews as Ben Hadad. But the Zakir inscription published by Pognon (*Inscriptions Semitiques*, Paris, 1907) shows that the name of the son of Hazael, also given by the Hebrews as Ben Hadad, was Bar Hadad. He was probably murdered by Hazael, who usurped his throne, according to 2 Kings viii. 9–15.

**BARHADAD II.** King of Damascus, son of Hazael. He reigned c.804–774 B.C. The inscription of Zakir, King of Hamath and Laash, speaks of Bar Hadad, son of Hazael, as "King of Aram." This settles the question of his name; *Bar*, 'son,' has been translated into Hebrew *ben*. According to Zakir, Bar Hadad led a coalition of several kings and cities against him, but failed to capture Hazrak. (See HADRACH.) In 803 he was obliged, after a siege of Damascus, to pay tribute to Adad-nirari IV of Assyria (812–783 B.C.). He was a contemporary of Joash of Israel and of Joash and Amaziah of Judah.

**BAR'HAM,** RICHARD HARRIS (1788–1845). An English humorist, known as "Thomas Ingoldsby." He was born in Canterbury, Dec. 6, 1788, and died in London, June 17, 1845. He began to study law, left it for the Church, and was ordained in 1813. In 1821 he was appointed minor canon of St. Paul's, London, and three years later became one of the priests in ordinary of His Majesty's Chapel Royal. In 1837 he began, in *Bentley's Miscellany*, the publication of the *Ingoldsby Legends*, a series of comic tales in irregular verse, by which he gained immediate fame as a humorist. Yet his life was grave and dignified, and he was held in high respect. Though a Tory in politics, he was the lifelong friend of Sydney Smith, the prominent Liberal; and Theodore Hook was also among his intimates. He published two novels, *Baldwin* and *My Cousin Nicholas*, and contributed largely to the *Edinburgh Review* and the *Literary Gazette*. "His sound judgment and kind heart made him the trusted counselor, the valued friend, and the frequent peacemaker; and he was intolerant of all that was mean, base, and false." For his biography, consult Barham, *The Life and Letters of the Rev. R. H. Barham* (London, 1880).

**BAR HAR'BOR.** See MOUNT DESERT.

**BAR'-HEBRÆ'US** (1226–86). A distinguished and prolific Arabic and Syriac writer. His full name was Yuhanna Abulfaraj ibn Harun; as bishop he assumed the name of Gregorius. He was born at Malatia in Armenia, and from the fact that his father Aaron was a Jew by birth, or, at all events, of Jewish descent, the son became known as Bar-Hebræus, that is, 'son of the Hebrew.' Bar-Hebræus himself, however, was a Christian and an adherent of the Jacobite sect. At an early age he entered upon the study of Arabic and Syriac, as well as of philosophy, theology, and medicine, and acquired such distinction that he was known among his contemporaries as "the phœnix of the age." In 1243 he went to Antioch and commenced a monastic life; in 1246 he was made Bishop of Gubas (near Malatia) and the following year he was transferred to Lakabhin, another diocese adjacent to Malatia. There he remained until 1253, when he was transferred to Aleppo, though he did not assume full charge until 1258. In 1264 he was made *maphrian*, or catholicus, a position next in rank to that of the patriarch. He died at Maragha in Azerbaijan on July 30, 1286.

Despite the absorbing duties incident to the charge of a large diocese, Bar-Hebræus manifested an astonishing literary activity, ranging over history, theology, philosophy, grammar, and medicine. Among his theological works his critical and doctrinal commentary on the entire Bible, which he called the "storehouse of secrets," is the most important. Only portions of this compilation have been published. In the realm of philosophy he compiled an encyclopædic survey of the whole Aristotelian discipline, which he subsequently rewrote in an abridged form. Best known is his great chronicle of universal history, written in Syriac. Beginning with Adam, it is brought down to his own days. The first part of it, containing the history down to the establishment of the Church, was published in Leipzig in 1789 by Bruns and Kirsch, and again, in a better edition, by Bedjan (Paris, 1890). The second and third parts, dealing respectively with the patriarchate of Antioch and the eastern branch of the Church, were published by Abbeloos and Lamy (3 vols., Paris and Louvain, 1872–77). This work was rewritten by Bar-Hebræus in an abridged form in Arabic and published under the title of *History of Dynasties*, by Pococke, with a Latin translation, Oxford, 1663, and again at Beirut, 1890, by Salhani. His grammatical treatises, which are exceedingly valuable, were published by Abbé Martin in 1872 (*Œuvres grammaticales d'Aboul Faradj dit Bar Hebræus*, 2 vols., Paris, 1872). Besides this, there are numerous medical treatises, mostly unpublished, as well as astronomical and cosmographical writings, and also a number of poems and tales. On his commentary to the Bible, consult Göttsberger, *Barhebräus und seine Scholien zur Heiligen Schrift* (Freiburg, 1900).

**BARI,** bä'rē. An archiepiscopal city and flourishing seaport on the Adriatic, the capital of the province of Bari delle Puglie, south Italy (Map: Italy, L 6). It is on the Bologna-Brindisi Railway, 69 miles northwest of Brindisi. The old part of the town, which is on the tongue of land that divides the old harbor from the new, has narrow, crooked, gloomy streets. The new part of the town is on a rectangular plan, with broad avenues, squares, and gardens. The most interesting building is the church and priory of St. Nicholas, founded in 1087, and fin-

ished in 1139 by King Roger, a Norman. It was here that Pope Urban II in 1089 assembled a council of Greek and Latin bishops to discuss the theological differences that divided the East and the West. The building contains the splendid mausoleum of Bona Sforza, Queen of Poland and Duchess of Bari, who died here in 1558. In a vault under the silver altar in the crypt lie the bones of St. Nicholas, from which is said to exude a fluid, *manna di San Nicola*, which heals miraculously. The Saint's festival, on the 8th of May, is attended by thousands of pilgrims. The cathedral, which dates from the first part of the eleventh century, was spoiled by repairs made in the eighteenth. Its dome was renovated in 1905, and other alterations made. It contains paintings by Paolo Veronese, Tintoretto, and Calabrese. The church of St. Gregory, an eleventh-century edifice and the old palace chapel of the Byzantine Governor, is very interesting. The castle, built in the twelfth century, is now used as a prison and signal station. Bari also has a seminary, a lyceum, the Ateneo, containing a technical school and a provincial museum, a casino, a theatre constructed by Antonio Niccolini, and fine public squares and gardens. In the Piazza Umberto I there was erected in 1905 a monument to King Humbert. The new harbor is accessible to the deepest ships, and the town enjoys a growing maritime trade. There is regular steamboat communication with Venice, Ancona, Triest, Brindisi, Genoa, and Marseilles. Bari manufactures organs, pianos, mirrors, furniture, candles, soap, oil, and cordials, and has an extensive commerce in oil, wine, almonds, saffron, grain, fruit, cotton, and wool. The United States and other countries are represented by consular agents. Pop., 1881, 61,500; 1901, 77,478; 1911, 103,168.

The importance of *Barium*, Gk. *Βάριον, Barion*, in the third century B.C. is shown by its coins. Horace wrote of the *Barii mœnia piscosi*. In the Middle Ages Goths, Greeks, Franks, Saracens, Lombards, Venetians, and Normans fought for the possession of it. Bari was an independent duchy from the fourteenth century until it was united with the kingdom of Naples.

**BARI.** A negro tribe living on the White Nile, near Gondokoro. They practice agriculture to some extent, but their chief occupation is the raising of cattle. They are a warlike people and offered a stout resistance both to the slave traders and to the Egyptians, until they were subdued by Baker Pasha in 1871. The Bari are very tall and finely formed. Both sexes shave the hair and paint the body red. Consult Kaufmann, *Schilderungen aus Centralafrika* (Brixen, 1862), and for a grammar of their language, Mitterrutzrer (Brixen, 1867). See AFRICAN LANGUAGES.

**BARIE,** bär'ē (Gk. *βαρύς, barys*, heavy). The unit of pressure in the C. G. S. system (q.v.) adopted by the International Congress of Physicists at Paris in 1900, and corresponding to a pressure of 1 dyne to the square centimeter. The practical unit of pressure is the *megabarie*, or a pressure correspondinng to a megadyne ($10^6$ dynes) to the square centimeter, and very nearly equivalent to the pressure of 75 centimeters of mercury. The megabarie is also a useful unit in that it corresponds approximately to the pressure of 76 centimeters of mercury under normal condition, or "1 atmosphere." This pressure is equal to 1.0133 megabaries. See MECHANICAL UNITS.

**BARILI,** bä-rē'lē. A town on the west coast of Cebu, Philippines, 27 miles west of Cebu, the capital of the province (Map: Philippine Islands, D 5). Pop., 1903, 31,617.

**BARILLA** (Sp. *barrilla*, impure soda). A crude sodium carbonate obtained from the ashes of marine plants, which were formerly raised for that purpose in Spain, Sicily, Sardinia, the Canary Islands, and the Levant. The seeds were usually sown at the close of the year, and in the following September the plants were ready for cutting. A month later the barilla was obtained in the following manner. Holes were dug in the earth, capable of holding one or two tons of the soda, iron bars were laid across the cavities, and the dried plants, mixed with reeds, were placed upon them and burned. The molten mass containing the alkali dropped into the pit beneath. The operation was continued until the pits were filled, after which they were covered with earth. When sufficiently cool, the barilla was ready for shipment. The crude soda contained about 20 per cent of alkali, together with sodium, calcium, and aluminum chlorides and sulphates, with a little sulphur. It was formerly much used for the manufacture of soap, but since the introduction of the improved process for manufacturing soda from salt, its production has declined. *British barilla* is the name sometimes given to kelp.

**BARING,** bā'rĭng, *or* bär'ing. The firm of Baring Brothers was long one of the greatest commercial houses in the world. Its founder was John Baring, a German, who settled in a small business in Exeter, England, in the first half of the eighteenth century. Two of his sons, Francis and John, established in London in 1770 a banking house. In November, 1890, owing to the continued failures of the Argentine Republic to pay the interest due upon its debt, which had been guaranteed by the Barings, the firm was threatened with suspension, but was saved by the action of the Bank of England, which, in conjunction with the firm of Brown, Shipley & Co., advanced the sum of £13,000,000 to tide over the crisis. The house of the Barings has since been reorganized as a limited company for carrying on a regular banking business, though on a less extensive scale than before.—SIR FRANCIS BARING (1740–1810) became a director of the East India Company, and being a stanch supporter of Pitt, was created a baronet by that minister in 1793. He took an active part in the discussions relative to the Bank Restriction Act of 1797.—SIR THOMAS BARING (1772–1848), eldest son of the above, succeeded his father in the baronetcy. He was a member of the Commons in 1830–32. He appears to have taken no active part in the business of the firm and is known chiefly as an admirer and encourager of art. His magnificent collection of paintings was dispersed by public sale after his death.—SIR FRANCIS THORNHILL BARING (1796–1866), son of Sir Thomas, whom he succeeded, was educated at Oxford. He entered the Commons for Portsmouth in 1826, and under successive Whig governments was Lord of the Treasury, Secretary to the Treasury, Chancellor of the Exchequer, and First Lord of the Admiralty. He was created Baron Northbrook in 1866.—THOMAS BARING (1799–1873), another son of Sir Thomas, devoted himself early to commercial pursuits, and also to politics, siding with the Tories, contrary to the traditions of his family. He was,

however, much more widely known as the principal manager of the firm of Baring Brothers than as a politician.

**BARING,** ALEXANDER, first BARON ASHBURTON (1774–1848). An English financier and statesman. He was born in London, Oct. 27, 1774, the second son of Sir Francis Baring. For many years he was commercially engaged in the United States and Canada in the service of the great London mercantile house founded by his father. While in this country he married, Aug. 23, 1798, Anne Louisa, eldest daughter of William Bingham, of Philadelphia, United States Senator; and to his alliance and to his American mercantile acquaintance he was much indebted in later life. On the death of his father, in 1810, he became the head of the firm of Baring Brothers & Co., and in 1812 was elected member of Parliament for Taunton. In the first administration of Sir Robert Peel (1834–35) he was President of the Board of Trade and Master of the Mint, and was created Baron Ashburton by patent in April, 1835. In 1842 Lord Ashburton's knowledge of business and thorough acquaintance with American institutions, customs, and modes of thought caused him to be appointed special Ambassador to the United States to settle the Northwestern Boundary Question and other disputes, which then threatened to involve the two countries in war. In August of the same year he concluded the famous Treaty of Washington, commonly called the Ashburton Treaty, by which the frontier line between the State of Maine and Canada was definitely agreed to. By this treaty seven-twelfths of the disputed ground and the British settlement of Madawaska were given to the United States, and only five-twelfths of the ground to Britain; but it secured a better military frontier to Britain and included heights commanding the St. Lawrence which the award of the King of Holland, who had been chosen arbiter, had assigned to the Americans. By the eighth and ninth articles provision was made for putting an end to the African slave trade, and the tenth article provided for the mutual extradition of suspected criminals. As an English statesman, Lord Ashburton opposed free trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. His death took place May 13, 1848.

**BARING,** EVELYN, first VISCOUNT CROMER. See CROMER.

**BARING,** MAURICE (1874– ). An English author and journalist. He received his education at Trinity College, Cambridge, and subsequently entered the diplomatic service in which he held various posts, being attaché to the British Embassy in Paris in 1898, Copenhagen in 1900, and Rome in 1902. From 1904 to 1909 he acted as special war correspondent for the *Morning Post* in Manchuria, Russia, and Constantinople. His writings comprise novels, essays, narratives, and poems, including *Hildesheim and Quatre Pastiches* (1899); *The Black Prince* (1892); *Gaston de Foix* (1903); *With the Russians in Manchuria* (1905); *Mahasena* (1905); *Desiderio* (1906); *Sonnets and Short Poems* (1906); *A Year in Russia* (1907); *Proserpine* (1908); *The Grey Stocking* (a comedy, 1908); *Russian Essays and Stories* (1909); *Orpheus in Mayfair* (1909); *The Story of Forget-me-not and Lily-of-the-Valley* (1909); *Landmarks in Russian Literature, Dead Letters, The Glassmender, Diminutive Dramas* (1910); *Collected Poems* (1911).

**BARING-GOULD,** SABINE (1834–1924). A very versatile and prolific English author, born at Exeter. He studied at Clare College, Cambridge, and in 1864 was appointed curate of Horbury (Yorkshire). In 1871 he became rector of East Mersea (Essex) and in 1881 of Lew-Trenchard (North Devon). From 1871 to 1873 he was editor of *The Sacristy*, a quarterly review of ecclesiastical literature and art. His opera, *The Red Spider*, was produced in 1898. The list of his published works is large in number and diversified in range. Valuable are his studies in the superstitions, legends, and folklore of the Middle Ages, such being *The Book of Werewolves* (1865), *Curious Myths of the Middle Ages* (2d series, 1866–67), and *Curiosities of Olden Times* (1869). His contributions to theology include *The Origin and Development of Religious Belief* (1869–70), *Lives of the Saints* (15 vols., 1872–77), and *The Lost and Hostile Gospels* (1874). In 1880 appeared his *Mehalah*, a powerful though somewhat uneven and melodramatic story (new ed., 1913), followed by *John Herring* (1883–86; 1913); *Court Royal* (1886–88), and *The Broom Squire* (1896; 1913); *Bladys of the Stewponey* (1897; 1910); *Virgin Saints and Martyrs* (1900); *A Book of Ghosts* (1904); *A Memorial of Nelson* (1905); *The Book of the Rhine from Cleve to Mainz* (1906); *A Book of the Pyrenees* (1907); *Cornish Characters* (1909); *Family Names and their Story* (1909; 1912); *Cornwall* (1910); *Cliff-Castles and Cave-Dwellings of Europe* (1911); *The Land of Teck* (1911); *Village Sermons to Simple Souls* (1912); new edition of the *Vicar of Morwenstowe* and of *Old Country Life* (1913).

**BARINGO,** bȧ-rĭn'gō. A lake in the East African Rift valley in lat. 0° 32′ N. (Map: Congo Free State, G 2). It lies at an altitude of 3675 feet, covers an area of 193 square miles, and although it is without visible outlet its water is fresh. Near the east shore are four small islands, and a larger island in the centre of this lake is inhabited. It was discovered in 1883 by J. Thomson.

**BA'RITE.** Natural sulphate of barium, also known as barytes, and heavy spar. The chemical formula is $BaSO_4$; analysis, 65.7 per cent BaO and 34.3 per cent $SO_3$; specific gravity, 4.3 to 4.6; hardness, 2.5–3.5. It crystallizes in the orthorhombic system, occurs in laminated and massive forms, usually white, opaque to translucent in color, resembles calcite, but easily distinguished by its weight and the fact that it is not acted on by acids. The massive cleavable forms decrepitate readily by heating, which offers a method of separating the mineral from sulphides having the same specific gravity. It rarely occurs pure, being generally associated with silica, lime, iron, and very often contains a small percentage of galena. The commercial sources are usually residual deposits in clay caused by the differential weathering of the inclosing limestone, in which the mineral was originally deposited by replacement, and sometimes veins; it also occurs as a gangue mineral with metallic ores. The production in the United States, which is decreasing, amounted to 37,487 tons in 1912, and came from Missouri and the southern Appalachian States. The value of the ore at the mine varies from $3 to $4, and the finished product from $12 to $22, depending on the grade.

The chief use of barite is in the manufacture of paints as an adulterant of white lead and in the manufacture of lithopone. When used alone as a pigment for paint, it is not satisfactory, as its crystalline nature renders it too transparent. Its large use in the manufacture of white rubber goods is rapidly being replaced by lithopone; the advantage claimed for lithopone is that it aids in vulcanizing. Its use in the paper industry is also decreasing. Other uses are in the manufacture of wall paper, leather, asbestos cement, and artificial ivory. The carbonate and chloride are used in cement to prevent efflorescence on bricks by forming insoluble sulphates with the sulphuric acid in the lime. Lithopone consists of a double precipitate of barium sulphate and zinc sulphide produced by calcining barite with coal, resulting in the formation of barium sulphide with some barium carbonate, dissolving the barium sulphide in water, filtering, and adding a solution of sulphate of zinc to the filtrate causing the precipitation of barium sulphate and zinc sulphide. This precipitate is calcined, ground, washed, dried, and pulverized. The adulterants of lithopone are usually china clay and gypsum. For complete bibliography see *United States Geological Survey Report* on "Baryte" for 1912.

**BAR'ITONE.** See BARYTONE.

**BA'RIUM** (Neo-Lat. from Gk. *βαρύς, barys,* heavy; alluding to its high specific gravity). A metallic element isolated in 1808 by Sir Humphry Davy. It is not found native, but occurs chiefly as the sulphate in barite, as the carbonate in witherite, and in other minerals of a more complex composition; also in mineral waters, the ashes of certain plants, and in sea water. Metallic barium was first obtained by Davy, who decomposed its hydrate with a powerful voltaic battery and obtained an amalgam of barium and mercury. The mercury of the amalgam was expelled by heating in an iron crucible. The metal itself (symbol, Ba; atomic weight, 137.4) was described by Davy as "silver-white," and by Bunsen as "golden-yellow" in color, so that it is questionable as to whether chemically pure barium has ever been obtained. It is a slightly lustrous, somewhat malleable metal, which melts at a red heat, but cannot be distilled. Its specific gravity is from 3.5 to 4.

The compounds of barium are used for a variety of purposes. Its peroxide, $BaO_2$, formed when the anhydrous monoxide is heated to a dull-red heat in a stream of oxygen, is used in the manufacture of peroxide of hydrogen. Barium peroxide may, further, be used as a bleaching agent as well as for preparing oxygen.

The monoxide of barium, called *baryta,* is found, in combination with carbon dioxide, as the mineral witherite, and in combination with sulphuric anhydride as the mineral barite, or heavy spar. It is prepared commercially by heating barium nitrate in a porcelain crucible or retort, or by igniting barium carbonate in the strong heat of a forge fire. It is a grayish white, extremely caustic, poisonous, and strongly alkaline mass, which finds its chief application in sugar refining, as it forms an almost insoluble compound with sugar when added to molasses or other saccharine solutions. Barium monoxide unites readily with water to form barium hydroxide.

*Barium sulphate,* the most important of the commercial salts of barium, is found native as the mineral barite or heavy spar (also called cawk or caulk). It is found in England, as in Derbyshire and Shropshire; also on the continent of Europe, and in the United States at various localities, but chiefly in Missouri, Tennessee, North Carolina, and Virginia. See BARITE.

*Barium chloride,* made by treating the native carbonate, witherite, with hydrochloric acid, is used in chemistry as a reagent, in the preparation of the artificial sulphate or permanent white, and for preventing incrustation in boilers.

*Barium nitrate* is prepared commercially by dissolving the native carbonate in dilute nitric acid and crystallizing the barium nitrate. It is largely used in pyrotechny, in the preparation of green fires, and in the manufacture of explosive compounds, as a substitute for potassium nitrate.

Barium salts, when brought into a non-luminous flame, burn with a yellowish-green color.

**BAR'JE'SUS.** See ELYMAS.

**BARK** (akin to Sw. and Dan. *bark,* LG. *borke;* possibly related to AS. *beorgan,* Ger. *bergen,* to cover). The term "bark" is a very indefinite one, for it is applied to different structures. In general, it is a structure that appears upon stems of shrubs and trees, and to understand its relation to other structures the structure of the stem must be described. The stem consists of a central vascular cylinder, invested by a cortex, and this in turn overlaid by the epidermis. The two regions of the vascular cylinder are the wood ("xylem") and the bast ("phloem"), the latter forming the outside of the cylinder and surrounding the xylem. Between xylem and phloem there is a layer of active cells called the "cambium," which forms new xylem on one side (within) and new phloem on the other. As a result, the so-called "annual rings" of wood (xylem) are laid down on the outside of the xylem cylinder, and new bast (phloem) is laid down on the inside of the phloem cylinder. This means a continual increase in the diameter of the stem, and it is very seldom that the epidermis grows in proportion. As a consequence, it is usually sloughed off, and in the meantime a new protective structure has been developed.

Either the outermost layer of the cortex or some deeper one becomes a cambium, and since its function is to form cork cells it is called "cork cambium" ("phellogen"). This cambium forms at its outer surface layer after layer of cork cells, a tissue peculiarly resistant to water. If the cork cambium is formed deep within the cortex, all the cortical cells outside of it die, since they are cut off from the water and food supply in the plant.

The two applications of the term "bark" are now obvious. In the one case bark includes all the structures outside the cork cambium, i.e., the layers of cork and more or less dead cortical tissue. In the other case bark includes all the structures outside the cambium of the vascular cylinder, i.e., phloem, living cortex within the cork cambium, the cork cambium itself, the layers of cork, and the dead cortical tissue. When bark is stripped from a tree, the easiest cleavage is through the vascular cambium, leaving the wood (xylem) exposed; and hence this more inclusive use of the term "bark" is more common in this country. In this case the two regions are distinguished as

"outer bark" (outside the cork cambium), which is dead and dry, and "inner bark" (between the two cambiums), which contains some living cells.

The cork cambium is often renewed year after year, and two prominent kinds of bark are formed. In one case the successive cork cambiums form zones completely around the stem, and the cork is deposited in concentric layers, forming "ringed bark." The cork oak is a notable example of ringed bark in which there is a very great accumulation of cork. In the other case the successive cork cambiums, instead of passing completely around the stem, run into the next outer one, thus cutting out segments which loosen and flake off, forming "scaly bark," as in hickory, apple, etc.

**Tanning.** The bark of many trees is capable of being used for tanning, but that is preferred which particularly abounds in tannic acid. Oak bark is principally used in Great Britain. See LEATHER.

The barking of trees can be accomplished with facility only in spring. The tree being felled, the rough, external, lifeless parts of the bark are removed as useless; the smaller branches are cut into lengths of about two feet, and their bark is loosened by beating with a mallet and is easily taken off; the bark of the trunk and main branches is cut by a chisel-like instrument or with an axe into similar lengths, each of which is divided longitudinally and finally stripped off by the aid of mallets, chisels, etc. The bark is sometimes dried in sheds, being placed on narrow shelves or frames in such a way that there may be a free circulation of air about it; sometimes in the open air, when it is very generally made to rest in a sloping position against trunks of trees placed horizontally at a little distance from the ground, the larger pieces of bark being placed so as to protect the smaller both from sun and rain. Great care is necessary in the drying of bark, as it is much damaged if allowed to get moldy and is liable to suffer injury from rain or from the exposure of its inner surface to the sun.

**Medicinal Barks.** The principal barks used in medicine will be found noticed in separate articles. (See ANDIRA [cabbage bark, Surinam bark]; ANGOSTURA BARK; EXOSTEMMA [Jamaica bark, St. Lucia bark, Pitou bark]; CASCARILLA [cascarilla bark, Eleuthera bark]; CINCHONA [cinchona bark, Peruvian bark, Jesuits' bark, Arica bark, Calisaya bark, Carabaya bark, Huamalies bark, Huanuco bark, Jaen bark, Loxa bark, Maracaibo bark, ash bark, crown bark, silver bark, yellow bark, tan bark, etc.]; CLOVE BARK; COPALCHE BARK; CULILAWAN BARK; WINTER'S BARK.) When bark is mentioned without any prefix, it is always cinchona, otherwise called Peruvian or Jesuits' bark, which is intended. Other barks used medicinally include cinnamon, which is used chiefly for flavoring; granatum, the bark of the pomegranate, used to expel tapeworms (see ANTHELMINTIC); and *Prunus virginiana*, or wild cherry, an ingredient of many cough mixtures. *Rhamnus purshiana*, or *Cascara sagrada*, is an important derivative of the bark of that plant. Ulmus, or slippery elm, is the inner bark of *Ulmus fulva*. It contains a large amount of mucilaginous material and is used as a demulcent. *Viburnum prunifolium*, a valuable uterine sedative, is obtained from the bark of the plant. See CINCHONA.

**BARK,** or **BARQUE** (LL. *barca, barica,* boat, probably dimin. of Gk. *βᾶρις, baris,* rowboat, Coptic *bari,* boat). A three-masted vessel, which is fore-and-aft rigged on the mizzenmast, the main and fore being square-rigged. A vessel of any kind, especially a sailing vessel of small size. The distinction between a *bark* and a *barkentine* is that the latter has only the foremast square-rigged, the main and mizzenmasts being fore-and-aft rigged.

**BARKAL,** bär'kăl, or **JE'BEL BARKAL.** An isolated mountain of sandstone in Nubia, near the Fourth Cataract of the Nile. It is situated about one mile from the river, is some two miles in circumference, and rises abruptly to the height of nearly 400 feet. The summit is flat, forming a broad plateau. In hieroglyphic inscriptions it is called "the holy mountain." Its appearance is most picturesque. Between Jebel Barkal and the river lay the ancient Ethiopian capital, Napata, destroyed by the Romans under C. Petronius, in 24 B.C. The site of the city is marked by the ruins of several large temples, among which that of the god Amon is the most conspicuous, and by groups of royal tombs, built in imitation of the Egyptian pyramids, though upon a much smaller scale. Excavations conducted at this place by the Egyptian government in 1862 yielded rich results in sculptures and hieroglyphic inscriptions of historic interest. The best representations of the monuments of Jebel Barkal are to be found in the fifth volume of Lepsius' *Denkmäler* (Berlin, 1842–45) and in Mariette's *Monuments divers* (Paris, 1872–80). For descriptions of the locality, consult Cailliard, *Voyage à Méroë* (Paris, 1819) and Hoskins, *Travels in Ethiopia* (London, 1835).

**BARK BEE'TLE, BARK CHA'FER,** or **ENGRAV'ER BEETLE.** A minute cylindrical beetle, of the family Scolytidæ. These beetles live in or under bark and in wood. Most of the very numerous species burrow between the bark and the wood, and a few forms tunnel through the wood. (See AMBROSIA BEETLE.) The female starts each series of engravings and deposits her eggs there. The young, on hatching, dig a series of burrows at angles with the original burrow of the parent. These beetles and their young are very destructive to trees, either killing them outright or injuring the value of the wood by means of their burrows. Several destructive species live in the United States, and one is extremely injurious to the pine forests of Germany.

There are some 150 species of the minute beetles belonging to this genus in the United States. A recent estimate of $100,000,000 annual damage to the forests of our country credits most of the harm to the Scolytidæ.

**BARK'ENTINE.** See BARK.

**BARK'ER,** ALBERT SMITH (1843–1916). An American naval officer, born at Hanson, Mass. He graduated at the United States Naval Academy in 1862, and during the Civil War took part in the capture of New Orleans and the siege of Port Hudson. He was promoted to be commander in 1877 and in 1892 to be captain. During the Spanish-American War he commanded the cruiser *Newark;* and afterward succeeded Admiral Dewey as commanding officer of the Asiatic Squadron. He was made a rear-admiral in 1899, commanded the Norfolk Navy Yard in 1899, the New York Navy Yard in 1900–03, and the North Atlantic fleet in 1903–05, when he was retired.

**BARKER,** EDMUND HENRY (1788–1839). An English classical scholar, born at Hollym, Yorkshire. He studied at Cambridge. Besides editions of Latin classics and numerous contributions to periodicals, particularly to the *Classical Journal,* he was led, during a residence with the famous philologist Samuel Parr, to undertake a revision of Stephanus' *Thesaurus Linguæ Græcæ* (12 vols., 1826). This gigantic work was violently assailed in the *Quarterly Review* by Blomfield, to whom Barker replied with his *Aristarchus Anti-Blomfieldianus* (London, 1818). In 1812 appeared the first volume of his *Classical Recreations.* He also supplied materials for the composition of Sturtz's *Etymologicum Gudianum.* He likewise translated some works of German philologists, among them Buttmann's *Greek Grammar for Schools.* He collected a mass of anecdote and criticism relative to his friend Dr. Parr, which was published in two volumes in 1828–29, under the title of *Parriana,* a work well-nigh unreadable from the superabundance and ill-digested nature of its matter. He also assisted Professor Dunbar in the compilation of his Greek and English Lexicon, published in 1831. He lost all that he had in a lawsuit, so that he was obliged to sell his fine library, and was put into the debtors' prison. He died in London in extreme poverty.

**BARKER,** FORDYCE (1818–91). An American physician. He was born at Walton, Me.; graduated at Bowdoin in 1837, and studied medicine at Harvard, Paris, and Edinburgh. He was then professor of midwifery at Bowdoin and afterward in the New York Medical College; was president of the New York State Medical Society, and professor of clinical midwifery and diseases of women in Bellevue Medical College. He wrote, in 1872, a treatise on *Puerperal Diseases* and a number of papers on other subjects.

**BARKER,** GEORGE FREDERICK (1835–1910). An American scientist. He graduated at the Yale Scientific School in 1858 and was chemical assistant in Harvard Medical School in 1858–59 and 1860–61. He was then, successively, professor of chemistry and geology in Wheaton (Ill.) College, professor of physiological chemistry and toxicology in Yale, and professor of physics in the University of Pennsylvania, in 1879–1900, when he became emeritus professor. He was president of the American Association for the Advancement of Science; president of the American Chemical Society; vice president of the American Philosophical Society for 10 years; a member of the United States Electrical Commission; and for several years an associate editor of *The American Journal of Science.* He lectured in many cities and wrote a *Text-Book of Elementary Chemistry* (1870); a *Physics* (1892), etc.

**BARKER** (HARLEY) GRANVILLE (1877– ). An English playwright who began his career as an actor and continued it as joint manager of the Court Theatre, London, and later as an author. He appeared in a number of Bernard Shaw's plays, and Shaw's influence on his work is obvious. He is a younger exponent of the realistic and revolutionary drama which would carry ideas into the theatre and make the stage responsive to the movements of thought and feeling that sway the world without. A criticism of moral, social, and political aspects of contemporary life is woven through his plays and voiced by characters who speak and act in the dispassionate, unromantic, rational, and "advanced" fashion of those who people the Shavian drama. His dramatic work is notable for technical skill and for a flexible and natural dialogue that produces the illusion of living speech, but tends in its abundance to smother or hamper the action. The plays of which Barker is sole author are: *The Marrying of Anne Leete* (1901); *The Voysey Inheritance* (London, 1905); *Waste* (London, 1907); *The Madras House* (London, 1910). He collaborated with Laurence Housman in *Prunella* (London, 1906), which was produced by Winthrop Ames in New York in 1913. With Berte Thomas he wrote *The Weather Hen,* and he paraphrased from the German Schnitzler's *Anatol* (produced New York, 1912). He collaborated with William Archer in writing a plea for *A National Theatre* (London, 1907).

**BARKER,** JACOB (1779–1871). An American financier and lawyer, born in Swan Island, Me., of Quaker parentage. He went to New York at the age of 16, engaged in trade, and soon amassed a considerable fortune. Early in the War of 1812 he was instrumental in securing a loan of $5,000,000 for the national government. In 1815 he founded the Exchange Bank of New York and subsequently became interested in many other large financial institutions in the city, including the Life and Fire Insurance Company, on the failure of which in 1826 he, with a number of others, was arrested on a charge of conspiracy to defraud. Barker at first conducted his own defense, but subsequently was represented by such eminent counsel as Benjamin F. Butler and Thomas A. Emmet. The jury disagreed on the first trial and convicted Barker on the second; but an appeal was granted, and the indictment was finally quashed. He removed to New Orleans in 1834, became prominent in financial circles, was admitted to the bar, and practiced with success in insurance cases. At the close of the Civil War he was elected to the United States Senate, but, Louisiana not having been readmitted to the Union, he was not allowed to take his seat. In 1867 he was declared bankrupt and spent the last few years of his life with his son in Philadelphia. He published *The Rebellion: Its Consequences and the Congressional Committee, Denominated the Reconstruction Committee, with their Action* (1866).

Consult: *Incidents of the Life of Jacob Barker from the Year 1800 to the Year 1855* (New York, 1855); Turner, *The Conspiracy Trials of 1826 and 1827: A Chapter in the Life of Jacob Barker* (Philadelphia, 1864); *The Speeches of Jacob Barker and his Counsel on the Trials for Conspiracy* (New York, 1826); and *The Trial of Jacob Barker, Thomas Vermilya, and Matthew L. Davis* (New York, 1827).

**BARKER,** J. ELLIS (1870– ). An English journalist and historian, born and educated at Cologne, Germany. He became known after removal to England as a contributor to the leading reviews of that country and as a lecturer before the Royal United Service Institution, the Medical Association, and other important societies. His writings include: *The Rise and Decline of the Netherlands* (1906); *British Socialism* (1908); *Great and Greater Britain: The Problems of Motherland and Empire* (new ed., 1910); *Modern Germany* (4th ed., revised, 1912).

**BARKER,** LEWELLYS FRANKLIN (1867– ). A Canadian-American anatomist, born at Norwich, Ontario. He studied at Pickering College and the University of Toronto, and in 1894–1900 was a member of the teaching staff at the Johns Hopkins University. He was head of the department of anatomy in the Rush Medical College of the University of Chicago, in 1900–1905, when he became professor of medicine at Johns Hopkins University, and chief physician at the Johns Hopkins Hospital. He received an honorary M.D. from the University of Toronto (1905) and an LL.D. from Queen's (1908) and from McGill (1911). In 1901 he became editor of the *American Journal of Anatomy*. His publications include: *The Nervous System and its Constituent Neurones* (1899); *Laboratory Manual of Human Anatomy* (1904); *Anatomical Terminology* (1907).

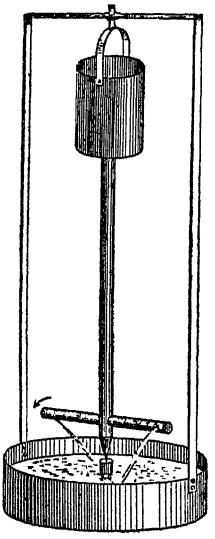
**BARKER,** MATTHEW HENRY (1790–1846). An English writer of sea tales, born at Deptford. He shipped on an East Indiaman, afterward served in the Royal navy, and from 1827 to 1838 edited a newspaper at Nottingham. Under the pseudonym "The Old Sailor," he wrote a number of sea tales, exceedingly popular at that time. The list of his works includes: *Land and Sea Tales* (2 vols., 1836); *Topsail-Sheet Blocks* (3 vols., 1838); *The Naval Club* (3 vols., 1843); *The Victory* (3 vols., 1844), and a *Life of Nelson* (1836).

**BARKER,** THOMAS JONES (1815–82). An English historical and portrait painter, born at Bath. He studied in Paris under Horace Vernet, in 1835–45 exhibited much at the Salon and subsequently at the Royal Academy. In his later life he was known especially as a military painter, and observed on the spot the Franco-Prussian War, of which, as well as of the Crimean War, he left numerous pictures. His works include "The Bride of Death" (1840); "The Meeting of Wellington and Blücher" (1851); "Wellington Crossing the Pyrenees"; "The Mêlée—Charge of Cuirassiers and Chasseurs" (1872); "Balaklava—One of the Six Hundred" (1874); "The Return through the Valley of Death" (1876).

**BARKER,** WHARTON (1846–1921). An American financier and publicist, born in Philadelphia, Pa. He graduated from the University of Pennsylvania in 1866, but prior to this time had organized and commanded a company in the Civil War. As a member of the banking firm of Barker Bros. & Co., he was appointed (1878) special financial agent of the Russian government. In this capacity he was intrusted with the building of four cruisers and was called to Russia to advise in the development of coal and iron mines. He also obtained valuable railroad, telegraph, and telephone concessions (later withdrawn) from China. As early as 1869 he founded the *Penn Monthly*, a weekly devoted to political, economic, and social questions, which in 1880–1900 was published under the name of *The American*. In the field of politics Mr. Barker became known as the proposer for the presidency of the names of Garfield and Harrison, and as one of the chief opponents of a third term for General Grant. Having left the Republican party in 1896 to join the Populists, he showed himself so zealous that he was made their candidate for the presidency in 1900. He became a member of several learned societies.

**BARK'ERS.** See JUMPERS.

**BARKER'S MILL** (Fr. *roue-à-réaction*, Ger. *Segners Wasserad*). A water wheel invented by a Dr. Barker towards the end of the seventeenth century. It is represented in its simplest or typical form in the cut. The water is supplied from a reservoir which opens into the upper part of the vertical tube, whence it issues from the lower orifices. The reaction caused by the water gushing from the arms forces them backward and gives to the whole machine a rotatory motion. This reaction is much the same as is seen in the recoil of a gun when fired, or in the pushing back of a small boat by the foot on stepping ashore.



BARKER'S MILL.

**BARK'ING** (AS. *Beorcingas*, descendants of Beorc). A town of Essex, England, a northeastern suburb of London, on the left bank of the Roding, 2 miles above its confluence with the Thames (Map: London, D 9). It has jute factories, manufactures coke, rubber, and chemicals, and vegetable gardening is extensively carried on for the metropolitan markets. The municipality owns electric and gas lighting plants, water works, and wharf; has provided artisans' dwellings, cottage allotments, recreation grounds, public baths, and free library, and maintains isolation hospitals and a cemetery. Its most notable edifice is the ancient and beautiful church of St. Margaret, and there are scanty remains of Barking Abbey, formerly one of the richest nunneries in England. It was founded in 670, by St. Erkenwald, Bishop of London, whose sister, St. Ethelburga, was the first abbess. It was burned by the Danes in 870, rebuilt by King Edgar in the tenth century, and dismantled by Henry VIII. Pop., 1891, 14,300; 1901, 21,500; 1911, 31,294. Consult *Barking Town: its Progress and Public Works* (London, 1897).

**BARKING BIRD.** See GUIDGUID.

**BAR'KIS.** A country carrier in Dickens's novel, *David Copperfield*. He marries David's nurse, Peggotty, to whom he proposes by sending her the message, "Barkis is willin'."

**BARK LICE.** See COCCIDÆ; SCALE INSECTS.

**BAR'-KOK'BA,** SIMON. The leader of the Jews in their great insurrection against the Romans, under the Emperor Hadrian, from 132 to 135 A.D. Hadrian's attempt to Romanize Judæa through the transformation of Jerusalem into a pagan city, and the gradual obliteration of Jewish customs, had awakened the fanatic zeal of the Jews all over the empire. Between 115 and 118 A.D., they rose in revolt in Cyrene, Egypt, Cyprus, and Mesopotamia, while in Palestine the only influence of the aged Joshua ben Hananiah retarded the outbreak. Under the inspiration of Akiba (q.v.), the successor of Joshua, secret preparations were begun for a rising of the entire nation. At the head of the movement stood Simon Bar-Koziba (i.e., of the

town of Koziba) to whom Akiba gave the name of Bar-Kokba, or, 'son of the star,' seeing in him the fulfillment of the prophecy, "There shall come a star out of Jacob" (Num. xxiv. 17). From all over the Orient Jews thronged to join his armies, which at the height of his power numbered no less than 400,000 men. He fought at first with great success against the Romans. Finnius Rufus could not resist the attack. The war spread over all the country of Palestine, and 50 towns, besides many villages and hamlets, came into the possession of the Jews. It is not probable, however, that Jerusalem fell into their hands. So important a fact would have been mentioned in the Jewish sources, but they do not refer to a capture of the holy city. But the success of the Jews was such that Publius Marcellus the legate of Syria was sent against them. He also was defeated. Hadrian then summoned his greatest general, Julius Severus, from Britain. The Romans are said to have fought 52 battles with the forces commanded by Bar-Kokba. Finally, in August, 135, Bethar, the last strong fortress held by them, was stormed by the Romans after a siege of nearly a year. According to Dio Cassius half a million of Jews perished in the assault and the massacre that followed, and among them fell Bar-Kokba. After the war many men were executed, thousands of women and children were sold into slavery, and cruel edicts were issued against the survivors. From this last struggle dates the final dispersion of the Jews over the face of the earth. The holy city was razed to the ground and rebuilt under the name of Ælia Capitolina. There can be no doubt as to the military genius and splendid patriotism of Bar-Kokba. But the disenchantment was so great, the punishment of the rebellion so severe, that the 'son of the star' was declared by many Jews to be 'the son of a lie,' with an allusion to the meaning of Koziba, which probably was the name of his birthplace. For a detailed account of the struggle, consult Münter, *Der jüdische Krieg unter den Kaisern Trajan und Hadrian* (Altona, 1821), and Schwarz, *Der Bar-Kochbaische Aufstand* (Brünn, 1885).

**BARKS'DALE,** WILLIAM (1821–63). A Confederate officer in the Civil War in the United States. He was born in Tennessee, was educated at Nashville University, studied law, and served in the Mexican War. In 1853–61 he represented Mississippi in Congress as a pro-slavery Democrat, and upon the outbreak of the Civil War resigned his seat to take command of the Thirteenth Mississippi Volunteers. He was promoted to be brigadier general, and fell at Gettysburg.

**BARK STOVE.** See HOTHOUSE.

**BARLAAM,** bär'lȧ-ăm (?–c.1348). A learned Italian monk. He was born at Seminaria, Calabria, and entered the Order of St. Basil. He afterward studied at Thessalonica, joined the Greek church at Constantinople, and wrote his polemical *Liber contra Primatum Papæ*. He was sent by Andronicus III in 1339 on a diplomatic mission to Pope Benedict XII, to obtain the assistance of Western Christendom against the Turks. Failing in this, he returned to Greece and attacked the Hesychasts, or Quietists, of Mount Athos. At a synod held in 1341 the Hesychasts were so skillfully defended that he hastened to Italy, reëntered the Roman church, and was appointed Bishop of Gerace. His principal work is *Ethica secundum Stoicos*. Barlaam was a man of great learning, distinguished as philosopher, mathematician, and astronomer. Among his pupils was Petrarch. Consult G. Manlari, *Fra Barlaamo Calabrese, mæstro del Petrarca* (Rome, 1888).

**BARLAAM AND JOS'APHAT.** One of the most widely spread religious romances of the Middle Ages. It is a Christianized version of the legendary history of Buddha, agreeing with it in many details. The story is briefly as follows: Josaphat was the only son of a heathen king in India, named Avenier or Abenner. In order to prevent the fulfillment of a prediction that he would be converted to Christianity, Josaphat was brought up in close confinement under the care of heathen teachers and surrounded by every luxury. Being visited, however, by a Christian hermit, Barlaam, he learned of the strange faith and was baptized. So great was his piety that he converted many of his companions and finally even his father. On the latter's death he succeeded to the kingdom, but soon after abdicated in favor of his friend Barachias and went into the wilderness. There, after two years of painful search, he found again Barlaam and lived a holy life. The celebrated divine, John Damascene, was formerly regarded as the author of the original Greek MS., which was first published by M. de Boissonade in the fourth volume of his *Anecdota* (Paris, 1832) and translated into German by Liebrecht (Münster, 1847). But even in the Middle Ages a Latin version of this romance had been extensively circulated. About the end of the fifteenth century it was often printed in a detached form, and later it appeared among the works of John Damascene (Paris, 1609). This theory of its authorship is no longer accepted. Vincent de Beauvais wove the story into his *Speculum Historiale*. In a condensed form the story appears in the *Golden Legend* of Jacobus de Veragine. From the Latin version sprang three French poetical versions belonging to the thirteenth century and as yet unprinted. The Italian *Storia di S. Barlaam* (latest ed., Rome, 1816) may be traced to a Provençal original as early as the beginning of the fourteenth century. In Germany Rudolf von Ems derived his poem, *Barlaam und Josaphat*, first printed at Königsberg (1818), and later at Leipzig, from the Latin. There is also an Augsburg impression of a prose translation of the ancient Latin text belonging to the close of the fifteenth century. *Baarlaam and Josaphat* appears in Middle English, in both a prose and a poetical version, the former edited by C. Horstmann. The Spanish *Historia de Barluam y Josaphat*, by Juan de Azre Solorzano (Madrid, 1608), the Polish poetical version, by Kulizowsky (Cracow, 1688), and also the Bohemian (Prague, 1593), are all borrowed from the Latin; while the Icelandic *Barlaams Saga*, and the Swedish popular tale, *Barlaam och Josaphat*, both from the fifteenth century, have a German source. A Norwegian version, printed from an old vellum MS. of the beginning of the thirteenth century, said to have been translated by King Hakon Sverreson, appeared in 1851 (Keyser und Unger, *Barlaams ok Josaphats saga*, Christiania, 1851). This romance has even been rendered into the Tagalog language of the Philippines and there printed (Manila, 1712). Consult: Liebrecht, *Zur Volkskunde* (Heilbronn, 1879); Max Müller, *Selected Essays* (London, 1881); H. Zotenberg, *Notice sur le livre de Barlaam et Joasaph* (Paris, 1886); Joseph Jacobs, *Barlaam and Josaphat* (London, 1896); Appel, *Gui von Cam-*

*brai und Josaphas nach den handschriften von Paris und Monte Cassino* (Halle, 1907).

**BARLÆUS**, bär-lē'ŭs, KASPAR, properly VAN BAERLE or BAARLE (1584–1648). A Dutch poet and historian, born at Antwerp. He studied theology at Leyden, was appointed professor of logic there in 1617, and in 1619 was deposed as a partisan of the Remonstrants. In 1631 he was called to the chair of philosophy and eloquence in the Athenæum of Amsterdam. He published *Poemata* (1645–46) and *Rerum per Octennium in Brasilia et Alibi Nuper Gestarum Historia* (1647).

**BAR-LE-DUC**, bär'le-dŭk', or **BAR-SUR-ORNAIN**, -sur' ôr'năN' (Fr. the duke's citadel, from Gael. *barr*, summit, projection, fort). The capital of the department of Meuse, France, on the Ornain and the Canal de la Marne, 158 miles by rail east of Paris (Map: France, N., L 4). It is divided into three parts by the river and canal and has fine boulevards. Its chief buildings are the fine fourteenth-century church of St. Etienne or St. Pierre, the Hôtel de Ville, at one time Oudinot's mansion, the Café des Oiseaux, containing a collection of stuffed animals and birds, a commercial museum, library, and a theatre. The manufacturing establishments include cotton and woolen mills, tanneries, breweries, paper mills, foundries, and confectioneries. It produces excellent wine, and a variety of currant jam made there is an important article of commerce. Bar-le-Duc dates from the sixth century and was formerly the residence of the Dukes of Bar. Pop., 1896, 18,249; 1901, 17,093; 1906, 17,307; 1911, 17,068.

**BARLETTA**, bär-lĕt'tà (anciently, *Bardoli*, later *Barolum*). An island port in the province of Bari, south Italy, connected with the mainland by means of a bridge across the Adriatic (Map: Italy, L 6). It is on the Bologna-Brindisi Railway, 35 miles northwest of Bari, with which it is also connected by a street railway. It is surrounded by ancient turreted walls and has spacious squares and broad streets. The houses are high, with flat terraced roofs, and built mostly of sandstone. There are many beautiful Byzantine churches, among them the cathedral of Santa Maria Maggoire, in which Ferdinand of Aragon was crowned. Interesting palaces are that of unhappy King Manfred, now turned into a convent, and the great castle constructed under Charles V. On the large square, facing the harbor, and in front of the Gothic church of San Sepolcro, stands the celebrated bronze statue, 15 feet high, found in the sea and evidently of Roman workmanship, said to be a likeness of Heraclius, Constantine, or Theodosius. In another square is a monument to the statesman Massimo d' Azeglio, who died in 1866. The inner harbor is accessible to small vessels only; but there is good anchorage for larger vessels in the roadstead, which is protected by a mole, running out into the sea, on which stands a lighthouse. Barletta has regular steamboat communication with other Adriatic ports and exports wine, oil, leather, cheese, fruit, hemp, and tartar. Imports include cotton, sulphur, and fish. In 1503, during the war between Louis XII and Ferdinand the Catholic, when Barletta was besieged by the French, there took place outside the wall, according to the rules of chivalry, the famous combat between 13 French knights and 13 Italian knights, led by Bayard, *chevalier sans peur et sans reproche*, and Prospero Colonna respectively. Nine miles west of Barletta, on the Ofanto, is Canne, the ancient Cannæ, where in 216 B.C. Hannibal inflicted a disastrous defeat on the Romans. Pop., 1881, 33,179; 1901 (commune), 42,022; 1911, 44,233.

**BARLEY** (AS. *bærlic*, from *bere*, Eng. *bear*, barley + *leác*, a leek, plant). *Hordeum vulgare*. One of the most ancient of cultivated plants, of the Gramineæ, or grasses. Its cultivation is mentioned in the Bible. It was grown by the ancient Egyptians, the Greeks, and the Romans, and by the Chinese long before the Christian Era. Barley is found growing wild in western temperate Asia, and this region is considered as its original home. The range of latitude in which barley is cultivated is quite large, being grown as far north as Alaska, Iceland, and Norway, as well as in Algeria, Egypt, India, and other countries with an almost equatorial climate. In Switzerland and Chile it ripens at an altitude of 5000 feet, but it rarely ripens on the plateaus of Peru, which have an elevation of 9000 feet.

The preparation of the soil for barley does not differ materially from that for wheat. The land should be plowed fairly deep and thoroughly pulverized to form a well-prepared seed bed. The soil should be porous, well drained, and of good fertility. Barley grows best on sandy and calcareous loams in northern latitudes, but in southern countries soils containing a little more clay give the best results. The plant has a comparatively short growing period, ranging from 75 to 90 days, and the tilth and fertility of the soil should be such as to enable it to make a rapid growth. An excess of nitrogenous manures in the soil is injurious. When barnyard manure is applied directly to the crop, it should be well rotted. The best method, however, is to apply it to a previous crop, preferably corn. Barley is very responsive to a good rotation, generally giving better yields when it follows a hoed crop like corn and when clover is included in the succession of crops. For illustration, see Colored Plate of CEREALS.

In the United States and Canada, as well as in the greater portion of Europe, barley is sown in spring, and in the countries along the Mediterranean Sea it is sown in the fall. It is, however, also grown to some extent as a winter annual in the Southern States. The quantity of seed sown per acre varies from 2 to 3 bushels. Barley germinates at about the same temperature as wheat, but the young plant is more susceptible to cold than wheat; and a light frost, shortly after it is up, is often injurious. In the regions of the United States where spring wheat is grown, it is a common custom to sow it after wheat and before oats are sown. It is generally sown broadcast, but many farmers, especially in England, prefer to sow it in drills from 8 to 10 inches apart. The crop is now generally harvested with the self-binder. As soon as the sheaves are dry enough, they are stacked or hauled into barns to prevent exposure to rains or damp weather, which discolors the grain and materially reduces its value. Barley ripens earlier than spring wheat and is harvested usually just before that crop. When grown for malting purposes, it should not be harvested before it is thoroughly ripe.

The different varieties of barley, considered by many botanists as all belonging to one species, comprise four distinct types, viz., two-rowed barley, *Hordeum sativum distichon*; four-rowed

barley, *Hordeum sativum vulgare;* six-rowed barley, *Hordeum sativum hexastichon;* and naked barley, *Hordeum nudum.* Some authorities consider these different types as distinct species. The varieties of barley grown in the United States are generally of the six-rowed type, while in Europe the two-rowed type predominates. The finest varieties of malting barley, including Chevalier barley and the various selections made from it, which are the most popular for malting purposes, belong to the two-rowed type. The four-rowed varieties, frequently called "bere" or "bigg" in England, were formerly extensively used for malt, but are now being more and more replaced by the two-rowed varieties. The characters which determine a good malting barley are composition, capacity and energy of germination, plumpness and weight of grains, mealiness, proportion of husk (glumes adhering to grain), color, smell, and absence of mutilated kernels. In malting, barleys of a high starch content and a low protein content are sought. Quick and even germination produces the best malt, hence the brewer's interest in the state of ripeness and the absence of injured grains—conditions which directly affect germination. Plumpness and weight of the grains and the proportion of husk give indications as to a high or a low percentage of starch. Mealiness is important, as it insures a much more ready transformation of the starch into soluble compounds than when the grains are hard and flinty. A musty smell and a stained or discolored appearance of the grain are evidences of injury and materially reduce the value of barley from the brewer's point of view. The best malting barleys of the world are produced in eastern and southeastern England. The well-known Chevalier variety was originated in Suffolk in 1819.

From 35 to 40 bushels of barley per acre is considered a good yield, although under very favorable weather and soil conditions the yield often reaches 60 bushels per acre or even more. The legal weight per bushel in the United States is generally 48 pounds. The world's annual production of barley is about 1,400,000,000 bushels, the leading countries in order of yield being European Russia, the United States, Germany and Austria-Hungary. In the United States the production has largely increased during the last 60 years. The total yield of barley in 1912 was 223,824,000 bushels as compared with 5,167,015 bushels in 1849. In 1912 the following States ranked first in total yield: Minnesota, 42,018,000 bushels; California 41,760,000 bushels; North Dakota, 35,162,000 bushels; Wisconsin, 24,843,000; and South Dakota, 23,062,000 bushels. The average annual yield throughout the United States is about 25 bushels per acre. The average price per bushel on December 1 of each year for the years 1900 to 1909 was 47.9 cents.

Barley is affected in much the same manner as wheat by attacks of smut and rust. It is, however, much less liable to disease than any other cereal crop. The loose smut of barley *Ustilago nuda,* is the most serious disease of this crop in the United States. It may be controlled by soaking the seed for six or seven hours in cold water followed by 15 to 30 minutes in water heated to 52° C. (124.6° F.). The seed should then be sown on clean land. See RUST; SMUT; WHEAT.

*Food and Feeding Value.*—Barley grain, hay, and straw, and several milling and by-products from the grain, are used as feeding stuffs. The grain, like other cereals, contains a fairly large proportion of protein (12.4 per cent) and a large proportion of nitrogen-free extract (69.8 per cent), chiefly starch. The other constituents are: water (10.9 per cent), fat (1.8 per cent), crude fibre (2.7 per cent), and mineral matter (2.4 per cent). Barley is a common feeding stuff in the Old World, being satisfactorily used for the grain ration of horses, cattle, and pigs. Its use is not general in the United States, being confined largely to the Pacific slope, where it is fed especially to horses. Tests at different American experiment stations have shown that, either alone or mixed with corn or other grain, it gives fairly satisfactory results with cattle, pigs, and sheep. In experiment with pigs, 80.1 per cent of the dry matter, 81.4 per cent of the protein, and 86.6 per cent of the nitrogen-free extract of barley was found to be digestible. Barley is grown quite extensively for hay in some sections of the United States, being cut for that purpose before the grain is mature. The principal by-products are barley bran, barley feed (from pearled barley), screenings, malt sprouts, and brewer's grains (q.v.). The mill products are meal and pearled barley. As a food barley is used chiefly in the form of "pearled barley," i.e., barley with the husks removed, ground to a round form and polished.

Barley is used for thickening soups, for making cooling drinks for invalids, and for a number of other purposes. The ground grain does not make a satisfactory bread; for, although it contains a fairly large amount of proteid matter, it is deficient in gluten. Barley water is sometimes used in the treatment of infants for intestinal disorders, and special barley preparations are combined with cow's milk in preparing food for infants and invalids.

**BARLEYBREAK.** A popular amusement, very common in the reign of James I and, with certain modifications in name and practice, still existing among young persons in both England and Scotland. Originally it was played by six people, three of each sex, who were formed into couples. A piece of ground was then apportioned into three parts, and into the central one, called *hell,* a couple was doomed by lot. The sport consisted in the condemned couple's "catching" one of the other couples while they were in the act of changing places, when the couple thus caught had to go into the centre. It was no easy matter, however, for the two in the centre to capture another couple; for, by the rules of the game, they were bound to keep united, while the others, when hard pressed, might sever. This quaint game is poetically described in Sidney's *Arcadia* and Suckling's *Poems.*

**BARLEYCORN,** JOHN. A personification of the spirit of barley or malt liquor, used jocularly and in humorous poetical effusions as by Robert Burns. There exists a whimsical English tract of old date, under the title of *The Arraigning and Indicting of Sir John Barleycorn, Knt., printed for Timothy Tosspot,* in which Sir John is described as of "noble blood, well beloved in England, a great support of the Crown, and a maintainer of both rich and poor."

**BARLEY RUST.** See RUST.

**BARLOW,** FRANCIS CHANNING (1834–96). An American soldier and lawyer, born in Brooklyn, N. Y. He graduated at Harvard in 1855 and was admitted to the New York bar. In 1861 he enlisted in the Twelfth New York Na-

tional Guard, and after a three months' term became lieutenant colonel of the Sixty-first New York Volunteers. He participated in the battles of Antietam, Chancellorsville, and Gettysburg and was mustered out with the rank of brigadier general and brevet major general. From 1866 to 1868 he was Secretary of State for New York and in 1872–73 was Attorney-General of the State. In the latter capacity he directed the prosecution of William M. Tweed (q.v.) and other members of the notorious "Tweed Ring" in New York City. He subsequently practiced law and was one of the founders of the Association of the Bar of New York City.

**BARLOW,** JANE (1860–1917). An Irish novelist, daughter of Rev. J. W. Barlow, vice-provost of Trinity College, Dublin. She was born at Clontarf, near Dublin, Oct. 17, 1860. She has described, with rare sympathy and humor, Irish village life, employing sometimes verse, but usually prose. *Bog-land Studies*, verse (1892), has been followed by *Irish Idylls* (1892); *Kerrigan's Quality* (1893); *The End of Elfintown* (1894); *The Battle of the Frogs and Mice* (1894); *Maureen's Fairing* (1895); *Strangers at Lisconnel* (1895); *Mrs. Martin's Company* (1896); *Creel of Irish Stories* (1897); *From the East unto the West* (1898); *From the Land of the Shamrock* (1900); *Ghostbereft and other Stories* (1902); *From Beach and Bog Land* (1905); *Irish Ways* (1909, 1911); *Flaws: a Novel* (1911). She was made an honorary Doctor of Letters by Dublin University.

**BARLOW,** JOEL (1754–1812). An American poet and man of affairs. He was born at Redding, Conn., March 24, 1754, and was educated first at Dartmouth, then at Yale, developing early great poetical aspirations. In 1780, two years after graduating, he entered the army as chaplain, and after the peace studied law at Hartford, where, in 1786, he was admitted to practice. In the previous year he had edited a *Book of Psalmody* for the Congregational churches of Connecticut, which was used until his religious opinions became heterodox. He also took part in political and literary journalism and wrote verses with the other "Hartford Wits." In 1787 his rather pompous poem, *The Vision of Columbus*, greatly admired at the time, made him very well known. It brought him also the European agency of the Scioto Land Company, which had acquired redemption rights in 3,500,000 acres of land in Ohio and sought to market them abroad. On this fraudulent mission Barlow innocently went in 1788 to France, beginning a long exile in which his religious and political opinions were much liberalized. He also passed some time in London, associating with the advanced liberals; and here, as well as in France, he published political works, the most noteworthy of which is *Advice to the Privileged Orders*, proscribed by the British government. Late in 1792 Barlow returned to France and was active in politics till his defeat as candidate for the Convention in 1793. At this period he obtained the hint for *Hasty Pudding*, his most popular poem, a mock heroic that is still readable. He now embarked in commerce and made a considerable fortune. In 1795, with great self-sacrifice, he became consul at Algiers and rendered valuable services to American prisoners. Returning to Paris, he led a literary life, preparing historical works on the American and French revolutions, which were never completed, and expanding his *Vision of Columbus* into an epic, *The Columbiad*, which, when published in 1807, in a magnificent quarto, was at first regarded as remarkably fine, but soon fell absolutely flat, because of its pomposity and its absurd attempt to foist upon almost contemporary events the traditional allusions of classical mythology. In 1805, having never lost his patriotism, which he had shown during the X Y Z Affair, he returned to America, where he was cordially received by the Republicans, but vituperated by the Federalists. Until 1811 he resided at Kalorama, near Washington, cultivating literature and farming. He was then appointed commissioner to Napoleon and accepted the office only from a sense of duty. Going to meet Napoleon at Vilna, he became involved in the disastrous retreat of the French army from Russia, and died of exposure at a small Polish village, Dec. 24, 1812. Barlow's merits as a poet were small, but he was a fair prose writer, a cultivated and enterprising man of affairs, and a true patriot. Consult Todd, *Life and Letters of Joel Barlow* (New York, 1886), and Trent, *American Literature* (New York, 1903).

**BARLOW,** JOHN WHITNEY (1838–1914). An American soldier, born at Perry, N. Y. After graduating from the United States Military Academy in 1861, he served throughout the Civil War. He was breveted captain in 1862, major in 1864, and lieutenant colonel in 1865 for his services respectively in the battle of Hanover Courthouse, the Atlanta campaign, and the battles before Nashville, Tenn. After the war he directed various military engineering works and harbor improvements and conducted explorations of the headwaters of the Yellowstone and Mississippi rivers. From 1892 to 1896 he was in command of the United States engineers in marking the boundary between the United States and Mexico. Subsequently he served as division engineer of the southwest division, then of the northwest division, and finally he was a member of the United States Board of Fortifications.

**BARLOW,** WILLIAM HENRY (1812–1902). An English engineer. He was born and educated at Woolwich. In 1832 he went to Constantinople, where he planned the factory and machinery for the improvement of the Sultan's ordnance, and examined the lighthouses at the entrance to the Bosporus. For this service he received from the Sultan the decoration of the "Nichan." He was the engineer of the new bridge over the Tay (1880–87), and coöperated with Sir J. Fowler and J. Harrison in designing the Firth of Forth Bridge. He was president of the Institution of Civil Engineers in 1880. Among his publications may be mentioned: *Illumination of Lighthouses* (1837); *Diurnal Electric Tides and Storms* (1848); *Resistance of Flexure in Beams* (*Proceedings* of the Royal Society, 1855); *The Logograph* (1874).

**BARLOWE,** ARTHUR (c.1550–c.1620). An English navigator. In 1584 he and Philip Amadas (q.v.) were sent out by Sir Walter Raleigh to find a favorite location for a colony in America. Leaving England April 27, they reached the Canaries May 10, and one of the West Indian Islands June 10, and "on the 2d of July," says Barlowe, "we found shole water, wher we smelt so sweet and so strong a smel as if we had been in the midst of some delicate garden abounding with all kinds of odoriferous flowers." Two days later they sighted a part of the North Carolina coast. They returned to England, bring-

ing glowing accounts of the beauty and attractiveness of the new country. Barlowe wrote a detailed narrative of the voyage in a letter to Raleigh, which may be found in vol. iii of Hakluyt, *Principall Voyages, Traffiques, and Discoveries of the English Nation* (London, 1599–1600), and has been reprinted, in part, in vol. i of A. B. Hart, *American History Told by Contemporaries* (4 vols., New York, 1897–1901).

**BAR'MECIDES,** or **BAR'MEKIDES.** A Persian family, celebrated in history as the ministers of the early Abbasside caliphs. Khaled-bin-Barmek was the Chancellor of the Exchequer under Abu'l Abbâs as-Saffâh, the first Abbasside caliph; and his influence endured through the reigns of Al-Mansur and Al-Mahdi. Yahya, the son of Khaled, was intrusted by Al-Mahdi with the education of his son, the celebrated Harun al-Rashid, and was made vizier by Harun upon his accession to the caliphate (A.D. 786). By his military skill and wise civil administration he contributed largely to the prosperity of the reign, the caliph himself bestowing on him the appellation of "Father." Yahya's sons, Fazl and Ja'far (the Giafar of the *Arabian Nights*), were greatly beloved by the caliph, who appointed Ja'far vizier to succeed his father. But the splendor of the family and the unlimited power it enjoyed gained it many enemies, who persuaded Harun that the Barmecides were aiming at the crown. The caliph caused Ja'far to be executed, and the others to be thrown into prison. He carried his emnity so far as to forbid the mention of their name on pain of death; but their virtues and their glory are celebrated by the Mohammedan poets and historians, whose munificent patrons they were. Consult Muir, *The Caliphate* (London, 1891), and Weil, *Geschichte der islamitischen Volker* (Stuttgart, 1866).

**BARMECIDE'S FEAST.** A phrase which originated in a story related in the *Arabian Nights* (Story of the Barber's Sixth Brother). A poor man who had not had food for two days visited one of the rich Barmecides, the influential Persian family in the time of Harun al-Rashid, and asked for food. He was invited to dinner. One after another, empty dishes were brought in, and the host asked the man how he liked the food. All was taken good-naturedly until the wine was brought, when the guest, pretending to be drunk, boxed the host on the ear. This bit of humor thoroughly delighted the Barmecide, and he ordered that a real feast be placed before the man.

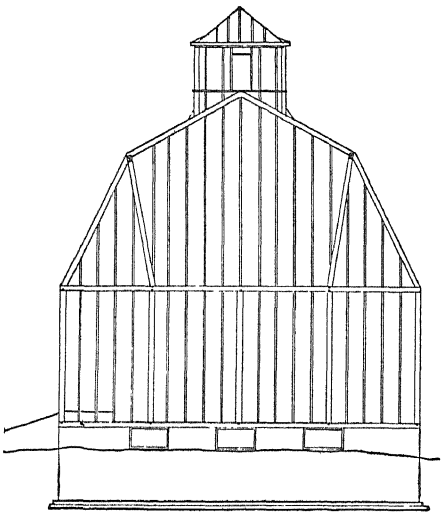
**BAR'MEN.** A city in the province of Rhenish Prussia, on the Wupper, about 25 miles northeast of Cologne (Map: German Empire, B 3). It is divided into upper, middle, and lower Barmen, includes several small villages, now united into one district, and its western boundary adjoins the city of Elberfeld. The city has clean and well-kept streets, the principal avenue being the Alleestrasse. The river, which flows through the length of the city, is crossed by many bridges. Among the noteworthy buildings are the old and the new Rathaus and the municipal theatre. There is only one park, which was formed from woodland purchased by the city. Barmen owns its water works, its gas works, and electric light plants, all of which net large profits to the city. It has numerous benevolent and charitable institutions, including a municipal hospital. Educational institutions consist of a gymnasium, several high schools, an industrial school, a natural-history museum, a library, and a picture gallery. The district adjoining the city is one of the most populous and prosperous in Germany. Barmen is the principal seat of the ribbon manufacture on the Continent, producing linen, woolen, cotton, silk and half-silk ribbons, and, in addition, cloth of various kinds, staylaces, thread, etc., all of which are widely exported. It has also considerable manufactures of soap, beer, pottery, candles, metal ware, buttons, machinery, organs, and pianofortes. There are, besides, in the valley, numerous bleachfields and Turkey-red dye works. Barmen has six railway stations and is in railway communication with all the principal German cities. Local traffic is served by several electric railways, including a novel aërial line built over and following the bed of the Wupper between Barmen and Sonnborn. Lower Barmen has a mineral spring and a bathing establishment. Pop., 1890, 116,000; 1900, 141,944; 1910, 169,214. Barmen was first mentioned in the eleventh century. By the fifteenth century the bleaching industry had become highly developed there, and its modern prosperity dates from its annexation to Prussia in 1815.

**BAR'MOTE COURT** (for earlier *bargemote, berghmote,* from *berg,* hill + *mote,* meeting). The name of local courts held in the lead-mining districts of Derbyshire, England, for the determination of the ancient rights and privileges of the inhabitants of those districts, in the lead mines, and for the settlement of disputes relating thereto. These courts are of great antiquity, but their jurisdiction and procedure are to a considerable extent regulated by statutes (14 and 15 Vict. c. 94). Consult *Encyclopædia of the Laws of England,* vol. ii, p. 18, and Bainbridge, *The Law of Mines and Minerals* (5th ed.; London, 1900).

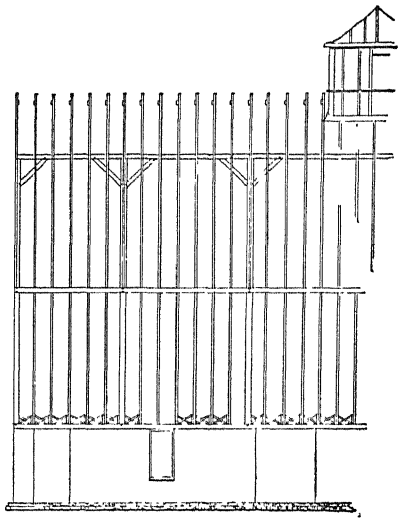
**BAR'MOUTH.** A picturesque watering place in Merionethshire, Wales, situated at the mouth of the Maw, 230 miles from London (Map: Wales, B 4). On the opposite shore lies Cader Idris, over 2900 feet high. It is a popular bathing and coaching resort. Pop., 1901, 2214; 1911, 2106.

**BARN** (AS. *berern, bern,* from *bere,* barley + *ern,* a closed place). A building used for the storage of feed, implements, machinery, and farm products, but more especially for the housing of stock, either under one roof or in separate, special buildings, depending on the size and type of farm. It is generally recognized that it is more convenient and economical of labor to make ample provision for all these purposes, except the housing of pigs, in one compact building on the farm of from 60 to 80 acres on which diversified farming is practiced. For larger farms or farms specializing in one or more lines it is often well to provide separate specially constructed buildings for the specialties.

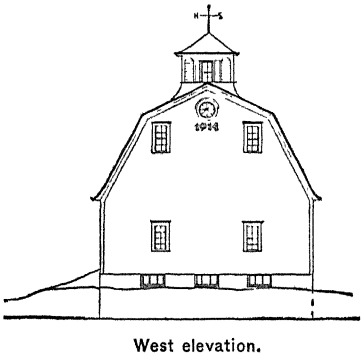
Convenience and economy of labor make it desirable to have the barn centrally located, whether for general or special use, in as direct communication as possible with those fields or pastures to which its use is most closely related and at a convenient distance from the farmhouse though not so near as to be offensive or dangerous in case of fire. The location selected should be well drained either naturally or artificially, but away from the farmhouse or any source of water supply in use. A hillside facing the south furnishes an especially desirable site, since in addition to good drainage this makes possible a clean dry basement and warm dry stalls and



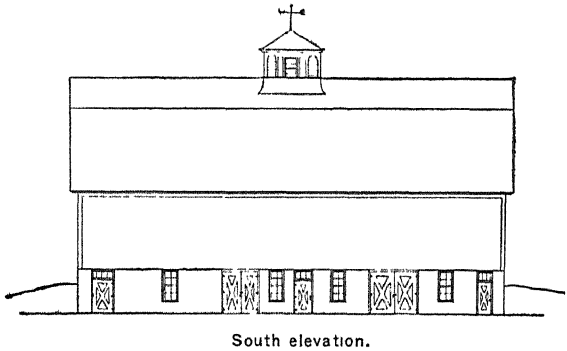
West elevation, showing framing.



South elevation, showing framing.

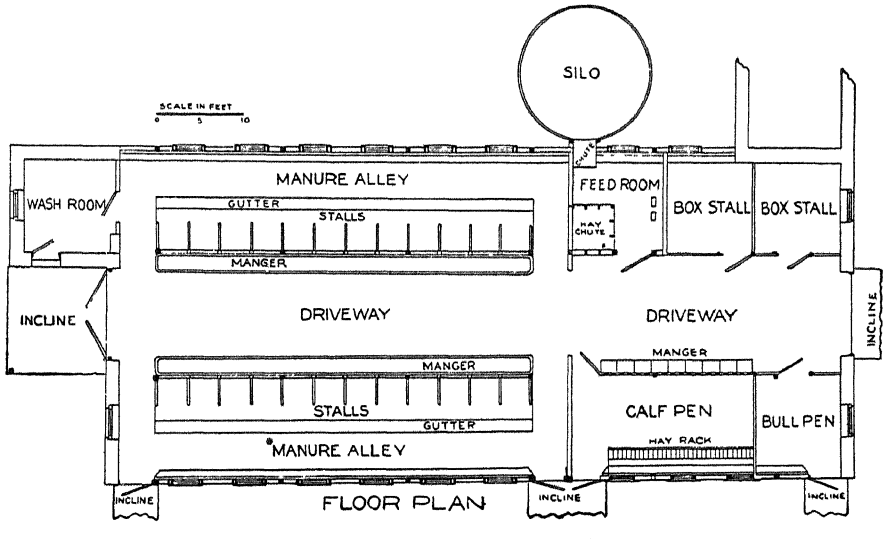



West elevation.



South elevation.

**Design and Construction of Typical American Horse and Cattle Barn, North Dakota Experiment Station.**




Floor plan of modern dairy barn for twenty-four cows

yards, opening on the grounds to the south, and a driveway to the upper floors for the general barn.

The main portion of the general barn, which may have two or more stories, is utilized mostly for the storage of feed, some farm products, and some of the implements that are in general and constant use on the farm. It should be constructed with a view to convenience and economy of space as well as strength, durability, and economy of material, the frame and balloon style of construction being especially adapted to this purpose. The farm animals are preferably housed in the basement. Adequate provision for proper lighting and ventilation is necessary for the health and comfort of animals. It is desirable that the basement face south, that windows be placed on both east and west sides, and windows and doors on the south side of the basement, so that the sun strike some inside portion of the basement at all hours of the day, and that the stalls be arranged conveniently for feeding and removing litter in parallel rows. Ventilation may be induced by means of flues opening near the floor or ceiling, but care should be taken that no animal is subjected to a direct draft.

An abundant supply of good water is also essential. Individual troughs are more hygienic than a common trough, but a common tank or trough in the open court constantly supplied with fresh water is a common and very satisfactory arrangement. If spring or artesian water under pressure is not available, a supply may be provided by pumping from wells or, in extreme cases, by storing rain water in cisterns. A constant supply under pressure is desirable and may be obtained by means of a storage tank placed in an upper story, by a pneumatic storage tank placed in the ground below frost line next to the building, or by the auto-pneumatic system in which water is supplied fresh from the well or cistern on opening a hydrant. Windmills, internal combustion engines, or electric motors are well adapted to supplying the power for pumping as well as for grinding feed and other belt work.

Special stock barns demand good drainage and good lighting; ventilation and warmth are important. Each stall should be specially designed and constructed for the accommodation of a particular type and size of animal. Concrete floors, runways, drains, and feedways in up-to-date stock barns are provided with litter and feed carriers traveling on steel tracks to facilitate the work of feeding and litter cleaning. A practically water-tight concrete manure pit located conveniently to the stock barns in which both the solid and liquid manure may be collected and stored with as little handling as possible, is a valuable addition, as it preserves the manure for fertilizing purposes and prevents pollution of the neighboring soil. There are many arrangements of stalls, but the best arrangement depends on the number and kind of animals housed and the location of the building. Stock barns usually have wide, slightly sloping roofs supported by steel trusses. These buildings are now constructed of lumber, brick, concrete, and cement block, or combinations of two or more of these. The brick and concrete materials have the advantages of strength, durability, fireproofness, and ease of erection, and constitute a building cool in summer and warm in winter. The initial cost, however, is somewhat higher than that of lumber.

Special hay barns are usually constructed of lumber and often are merely roofed with the siding extending only a short distance down, leaving the lower part of the sides open. Combination hay and stock barns have a high, wide, and long hay space in the centre with long low-roofed sheds surrounding this space in which the stock may gather and feed on the hay. Up-to-date hay barns are equipped with a steel track, hay fork, and carrier for elevating and depositing the hay.

The plan and construction of a barn will vary with the purposes for which it is used. It should be completely planned, even though it is intended at first to construct only a part of it. There is an almost infinite variety of internal fixtures for both stock and general barns, ranging from the very simple and cheap to the very elaborate and costly. Every barn used for the housing of stock, however, should be provided with one or more box stalls for the use of animals with young. A silo (q.v.) is a valuable adjunct, especially to a stock barn; it should form part of the structure, if possible, or should be so located that it will be easy to fill and convenient to feed from. Silos are now constructed of wood, concrete, concrete blocks, hollow tile, reinforced monolithic concrete, and galvanized steel metal, and some are constructed all or in part under ground.

**Bibliography.** Radford, *Practical Barn Plans and All Kinds of Farm Buildings* (Chicago and New York, 1911); McConnel, *Farm Equipment: Buildings and Machinery* (London and New York, 1910); Winder, *Handbook of Farm Buildings, etc.* (London, Sheffield, and Glasgow, 1908); Ocock, "The King System of Ventilation," *Wisconsin Experiment Station Bulletin 164* (Madison, Wis., 1908); Shaw and Jeffery, "College Farm Buildings," *Michigan Experiment Station Bulletin 250* (East Lansing, Mich., 1907); *Farm Buildings* (Chicago, 1907); Curtis, *Farm Buildings for Land Owners, Agents, and Tenants* (London, 1912); Radford, *Practical Country Buildings* (Wausau, Wis., 1912); Fraser, "Economy of the Round Dairy Barn," *Illinois Experiment Station Bulletin 143* (Urbana, Ill., 1910); Dolve, "Barn Plans," *North Dakota Experiment Station Bulletin 97* (Agricultural College, N. Dak., 1912); Hill, "Practical Suggestions for Farm Buildings," *United States Department of Agriculture Farmers' Bulletins 126, 190, and 461* (Washington, 1901, 1904, and 1912).

**BARNABAS** (Gk. Βαρνάβας). The surname given by the Apostles to Joseph, one of the members of the early Jerusalem church and interpreted by the author of Acts to mean 'Son of Consolation' (Acts iv. 36), or 'of Exhortation.' He was a Levite and a Cyprian by race, though doubtless, in view of his aunt having her home in Jerusalem, he was at this time a resident of that city. He contributed to the community of goods among the disciples (Acts iv. 36, 37). He was sponsor for Saul (Acts ix. 27), an act which would seem not only to indicate the influential position which Barnabas held among the disciples, but to involve some previous acquaintance between Barnabas and Saul. This inference is borne out by his subsequent commission by the Church of Jerusalem to investigate the work at Antioch, from which place he went to Tarsus to secure the services of Saul. In this Antioch church he also quite naturally came to assume a prominent place, being represented at the head of the prophets and teachers who

were active there (Acts xiii. 1). Together with Saul, he was commissioned by the Antioch church to carry up to Jerusalem the relief prepared for the famine-stricken brethren of the city (Acts xi. 27–30), from which journey they returned only to be sent out by the home church upon missionary work for which they had been divinely selected (Acts xiii. 2).

Throughout this first missionary tour, embracing the southern region of Asia Minor, he was the efficient companion of Paul, returning with him to Antioch, where they became involved in the contention started by the Judaizing Christians (see JUDAIZERS) regarding the necessity of circumcision as a condition of salvation (Acts xv. 1), a contention to which the Jews had doubtless been aroused by the extraordinary success of the mission among the uncircumcised Gentiles. The question was brought by them before the Apostles and elders (Acts xv. 2). From this journey they returned to Antioch, where they again engaged in the work of the local church, until Paul suggested that they visit once more the churches which they had established on their missionary tour, when, owing to a dispute between them as to the efficiency of Mark, a nephew of Barnabas, in the work, they separated from each other, Barnabas taking Mark with him and going to Cyprus, his native place (Acts xv. 36–39). There had been previous difficulty between Paul and Barnabas, immediately after their return to Antioch from the council at Jerusalem (Gal. ii. 11–21), where Barnabas is shown to be somewhat out of harmony with Paul's broader Gentile views and is really included with Peter in Paul's severe rebuke. From this time Barnabas disappears from apostolic history, for Paul's mention of him in 1 Cor. ix. 6 merely implies that Barnabas was still engaged in active missionary work, not that he was again in Paul's company; while his reference to him in Col. iv. 10 would seem to indicate his death, since otherwise it is difficult to account for Mark's return to work with Paul.

The traditions concerning his subsequent life —that he proclaimed the gospel in Rome, even during the lifetime of Jesus; that he was founder and first bishop of the church at Milan; and that he suffered martyrdom at Salamis, on his native island of Cyprus—are valueless.

Tertullian assigns to him the authorship of the New Testament Epistle to the Hebrews (see HEBREWS, EPISTLE TO THE), referring to the current tradition of the Church as so accepting it, and quite evidently implying that he had MS. authority for his view. There is also a pseudepigraphical epistle which has come down to us under his name, and an apocryphal Acts, of late date, and an apocryphal Gospel, obscurely referred to, bear his name. See BARNABAS, ACTS, EPISTLE, AND GOSPEL OF.

**BARNABAS, ACTS, EPISTLE, AND GOSPEL OF.** 1. The apocryphal *Acts of Barnabas*, a work of late date, recounts his missionary tours and his death by martyrdom in his native Cyprus.

2. The extant *Epistle of Barnabas*, found in the Sinaitic MS., at the close of the New Testament writings, a didactic work, full of allegorical interpretations of the Old Testament and strongly anti-Jewish in its tone. Although Barnabas was held to be its author by early Christian writers from Clement of Alexandria on, the Epistle itself makes no such claim. In fact, while its contents disclose an Alexandrian rather than a Palestinian style of thought and to this extent support the traditional authorship, yet the clear evidence given by the Epistle that its author was a Jew by persuasion rather than by birth, together with its extravagant denial of all historical connection between Judaism and the Gospel, renders any ascription of origin to the missionary companion of Paul out of the question. The place of its origin, as well as of its earliest reception, is Alexandria, and the readers to whom it was addressed are to be found in Lower Egypt. It has been variously dated—from as early as 70–79 to about 130 A.D. In view of the obvious interpretation which is to be given to the apocalyptic passage in chap. iv, the earlier of the above dates is to be preferred.

3. The existence of an apocryphal *Gospel of Barnabas* is hinted at in several obscure references in ancient documents, as, e.g., in the *Decretum* of Pope Gelasius, 496 A.D. What it contained is unknown, the extended Gospel, found under this name in a single Italian MS. (edited, with an English translation, in 1907), being a Mohammedan product with Gnostic elements.

**Bibliography.** For text and English translation of the *Epistle*, consult: Lightfoot, *Apostolic Fathers*, ed. Harmer (London, 1893); G. Krüger, *History of Early Christian Literature* (Eng. trans., New York, 1897); A. Harnack, *Chronologie der altchristlichen Litteratur*, vol. i (Leipzig, 1897). Consult also "Barnabas," in Hastings, *Dictionary of the Bible*, vol. i (New York, 1898), and id. in Cheyne, *Encyclopædia Biblica*, vol. i (New York, 1899).

**BARNABITES.** An order of monks which sprang up at Milan about 1530. They were so called because the church of St. Barnabas in that city was granted them to preach in. They were approved of by Pope Clement VII (1533) and Pope Paul III (1535). Their official title is "Regular Clerks of the Congregation of St. Paul." Their special duties were to attend the sick, to preach, to instruct the young, and to take the charge of souls. They soon established themselves in Italy, France, Austria, and Spain and enjoyed the privilege of teaching theology in the schools of Milan and Pavia. Many eminent men have been sent forth by them. Besides the three usual monastic vows, they took a fourth, viz., not to sue for church preferments, or to hold any post outside of their order without the Pope's special permission. In France and Austria they were employed in the conversion of Protestants and engaged in missions in China and Burma. They were expelled from France in 1880, but still exist in Belgium, Austria, and Italy.

**BARNABY,** SIR NATHANIEL (1829–1915). An English naval architect. He was born at Chatham of a family long associated with the Royal Dockyard in that city. He was educated at Chatham, Sheerness, and Portsmouth, where in 1848 he received the admiralty scholarship. He took part in planning nearly all the war vessels constructed between 1855 and 1885 and was one of the founders of the Institution of Naval Architecture (established 1860). He introduced the change from iron to steel in English shipbuilding in 1872 and advanced the plan of subsidizing merchant vessels for use in war. In 1885 he was made a K.C.B. His principal publication is *Abridgments of Specifications Relating to Shipbuilding, etc., from 1618 to the Present Time* (1862).

**BARNABY RUDGE.** One of Dickens's novels (1841). It contains an account of the Gordon Riots in London, June 2–7, 1780. The principal character is a half-witted man, who gives the book its name. He is condemned to death as a rioter, but is finally reprieved.

**BAR'NACLE.** A popular name for the crustaceans of the order Cirripedia, notable for the fact that in their adult form they are always attached to some foreign object, such as ship bottoms, wharf piles, floating timbers, rocks, or even whales, or else live parasitically within other crustaceans. The ultimate origin of the word "barnacle" is unknown, but it was originally applied to the barnacle goose of northern Europe, and its transfer to these crustaceans was due to the fables formerly current in regard to the reproduction of the bird. (See BARNACLE GOOSE.) Considering the popular ignorance, both of the breeding habits of the geese and of the structure of barnacles, it is not extraordinary that the absurd tales in vogue should have found credence, the crustaceans be regarded as the young of the birds, and the name be transferred to them. Goose barnacles (*Lepas*) were thus the first cirripeds to which the name was applied, and in Great Britain it is even now restricted to them and to similar stalked forms. Elsewhere, however, the name "barnacle" is now used for the sessile forms also, and even more broadly as the English term for all cirripeds.

**Structure.** Barnacles may be broadly defined as attached or parasitic crustacea, with an indistinctly segmented body, surrounded by a mantle, which generally calcifies and forms more or less of a shell or case. As they are attached by the head end, the first pair of antennæ (adhering organs) are very minute, and the second pair are reduced. There are generally six pairs (less frequently three or four) of long, biramous, tendril-like feet, though in parasitic forms these are wanting. There are no heart and no blood vessels, and gills and other organs of respiration are therefore naturally wanting. Barnacles are generally hermaphroditic, but in some species dwarf males occur, living in the mantle cavity of the normal individuals. In a few species the sexes are separate and dimorphic. In their development barnacles undergo a most remarkable and very characteristic metamorphosis. The eggs hatch as minute, somewhat triangular larvæ, with three pairs of limbs, and a projecting horn or process on each side anteriorly. On the under side of the head is a prominent upper lip. This larva sheds its skin several times as it grows, and finally appears as a larger, but still actively swimming creature, provided with a bivalve shell, like that of a clam. The body is segmented, and there are six pairs of biramous feet. The antennæ are modified to serve as organs of adhesion, and a "cement" gland is formed and opens in their second joint. This larva attaches itself by these antennæ, and after a resting or pupa stage becomes transformed into the adult barnacle, as a caterpillar changes into a butterfly. There is this important difference between the two processes, however, that a butterfly does not grow, its size being no greater at death than when hatched, while barnacles continue to grow throughout life.

**Classification.** Barnacles are classified upon the manner of life and the method of attachment. The order Cirripedia is divided into five families, as follows:

1. Lepadidæ, having the head end elongated to form a flexible stalk.
2. Balanidæ, without a stalk, but having the body surrounded by a ring of calcareous plates.
3. Alcippidæ, without stalk, or ring of plates, only three or four pairs of feet.
4. Proteolepadidæ, without stalk, plates, or feet.
5. Kentrogonidæ, without stalk, plates, feet, mouth, or digestive system.

The last three of these families are parasitic, and their reduced structure is directly traceable to their mode of life. The anatomy and natural history of barnacles can be most clearly stated by treating each family separately, though it may be said once for all that all barnacles are marine, except a single brackish-water species of *Balanus*.

The Lepadidæ take their name from the Greek word λεπάς, a limpet, probably with reference to their being attached forms. The head end is more or less elongated to form the stalk by which the animal is attached. This stalk is fleshy, but tough and flexible; its length varies greatly, up to 10 or 12 inches. Within it are contained the cement gland, with its duct opening at the tip, and near the base the ovary, with oviduct opening above in the mantle cavity. The oral portion of the head, the trunk, and the appendages are contained within the mantle, which forms a laterally flattened sac, opening by a slit-like aperture at the upper or outer end, on the ventral side. The mantle is chitinous, but contains, deposited in its wall, the plates of lime which compose the shell. There are five of these plates, a median unpaired one (the *carina*) on the dorsal side, an anterior one on each side (*scuta*), and a posterior one to each side (*terga*). There may also be small accessory plates on each side. The animal is so placed within the mantle that the mouth opens on the upper side of the attached end, the trunk curving backward and upward, and bearing the curious tendril-like feet on the ventral side. These feet are thus above the mouth, and in life project more or less freely from the opening of the shell; they are very flexible, and by their movements are continually bringing particles of food into the mantle cavity and down to the mouth. There is a liver or digestive gland connected with the stomach, but a large part of the trunk is occupied by the male reproductive organs. On the ventral side of the body is a strong muscle, by means of which the shell can be tightly closed. The nervous system consists of a brain and a ventral cord; but sense organs, other than those of touch, seem to be wanting in all adults, though eyes are present in the larvæ. The Lepadidæ are very widely distributed, but occur chiefly in the warmer seas. They are popularly known as goose barnacles or goose mussels, the latter name referring to the superficial resemblance they have to the mollusks known as mussels (q.v.). Although this resemblance is very slight, barnacles were long classed as mollusks because of the presence of a shell. The number of species of goose barnacles is not large; but, owing to their becoming attached to the bottoms of ships, they are transported from one side of the globe to the other, so that the same species sometimes occurs in the harbors of Europe, Asia, Africa, Australia, and both coasts of America. Naturally, those which attach themselves to rocks or other fixed bodies have a much more restricted range. None of the Lepa-

didæ are of large size; the body is usually under an inch in length, though the stalk is sometimes 10 times as long. The colors are generally inconspicuous—the stalk and mantle pale brown, the calcareous plates pearly blue. None of the Lepadidæ have any economic value.

The *Balanidæ* take their name from the Greek word *βάλανος*, an acorn, in reference to the shape of the shell. In Great Britain these barnacles are usually called "acorn shells," but the name is not in common use in the United States. The shell is much more fully developed than in the Lepadidæ, and owing to this and the absence of a stalk, they differ superficially from that family to a marked degree. The mantle forms a truncated conical sac, attached by the base, and opening at the upper or posterior end. This opening can be closed by four plates which correspond to the scuta and terga of the goose barnacles. The mantle itself calcifies into six or more vertical plates, which are broadest at the base and which can be more or less drawn together at the top, over the scuta and terga. The internal anatomy is very similar to that of the preceding family, but the ganglia of the ventral nerve cord are fused into a single large ganglionic mass. The Balanidæ are even more widely distributed than the Lepadidæ and are more abundant in the colder oceans. They often incrust rocks, wharf piles, and other submerged timbers, and the bottoms of boats, and are frequently found on crabs, mollusks, and other marine animals. They are generally small, less than 2 inches in height; but the largest-known barnacle is *Balanus psittacus*, which is sometimes 9 inches high and 4 inches in diameter. This species is of additional interest from the fact that large quantities are gathered on the coast of Chile for food and export. Other species are also eaten, especially by the Chinese, and the Romans regarded some of the Mediterranean forms as great delicacies. The flavor is said to be like that of other crustaceans, as shrimps, lobsters, etc. The shells of the Balanidæ are very hard, and when clean are almost pure white.

The *Alcippidæ* are a very small family of minute species, which live in burrows in the shells of mollusks and some of the larger cirripeds. The mantle lines the burrow and is attached at one side by a horny disk. The sexes are separate, and the females are much larger than the males, which are generally found living within the mantle cavity of the females, but it is not certain that they remain there through life.

The *Proteolepadidæ* are a still smaller family. The species are minute, maggot-like animals, with no limbs, parasitic in other crustaceans. So degenerated is the adult female by its parasitic life, that its body consists only of a sac containing the reproductive organs, attached to the crab by numerous fine root-like processes. On account of these, which have arisen from the head of the young, these animals are also known as *Rhizocephala*, or 'root-headed' animals. The best-known genus is *Sacculina*, which has long stood as the extreme example of the degenerating effect of a parasitic life. The members of these last two families of barnacles would never be recognized as cirripeds at all from a study of their anatomy alone. But the study of their embryology and the knowledge of their life histories have revealed clearly their ancestry and relationship; for in early life the larvæ of both these families show the same essential characters as the larvæ of other barnacles, and it is only after they have taken up their abode in their host that the degeneration becomes marked. In *Sacculina* the males never become attached to a host, but remain in the larval condition throughout life, except for the development of the reproductive organs.

Barnacles have a special historical interest to every biologist, from the fact that the only extensive systematic work in zoölogy done by Darwin was done upon this group. The classical volumes entitled "monographs" of living and fossil Cirripedia, by Charles Darwin, published by the Ray Society of London in 1851–54, will always be invaluable to students of the Crustacea. Darwin spent eight years on this work, and it illustrates admirably his patience, thoroughness of investigation, and clearness of expression. Another important work on barnacles is part xxviii of the *Challenger* reports; Hoek, *Report on the Cirripedia Collected by H. M. S. Challenger* (London, 1884); Pilsbury, "On the Classification of Scalpelliform Barnacles," *Proceedings*, Academy of Natural Sciences of Philadelphia (Philadelphia, 1908); *Barnacles of Japan and Bering Sea* (London, 1911).

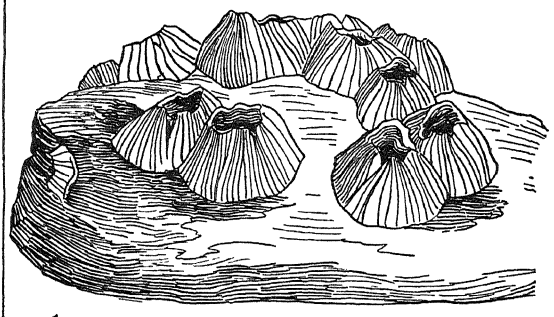
**BARNACLE,** Lord Decimus Tite. The extremely self-sufficient nobleman who, with his two sons, Clarence and Ferdinand, is in charge of the "Circumlocution Office," in Dickens's *Little Dorrit*.

**BARNACLE EATER.** See Filefish.

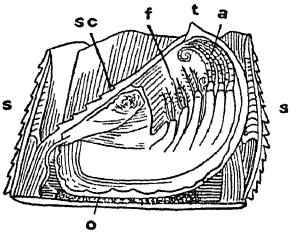
**BARNACLE** (prob. *bernicle*) **GOOSE.** A goose (*Branta leucopsis*), common in northern Europe and Greenland, but rare in North America. The name arose from the fables of former days, which represented it as developing from a stalked or "goose" barnacle. In size the barnacle goose is smaller than the common wild goose, being only a little more than 2 feet long and weighing about 5 pounds. It is very prettily marked, having the forehead, cheeks, and throat white, the bill black, and a black stripe extending from it to the eye; the crown of the head, neck, and upper part of the breast black; the rest of the plumage, on the upper parts of the body chiefly ash-gray and black in undulating bars, on the lower parts white. This fowl is migratory in Great Britain and most of northern Europe, appearing in the fall and wintering, but passing northward to the Arctic regions to breed. It is much sought after by hunters and is highly esteemed for the table. Several other species of goose are closely allied to the barnacle and are often confounded with it, notably the brants (q.v.). In northern Asia the barnacle goose is replaced by the red-breasted goose (*Branta ruficollis*), a beautiful bird, the neck and upper part of the breast of which are of a rich chestnut-red. It is somewhat smaller than the barnacle goose and is rarely seen in Europe.

*The Story of Barnacles and Geese* referred to above is one of the most curious in the chronicle of superstition. It appeared, at least earlier than the eleventh century, in two forms—one that certain trees, always growing in the water, produced fruit, in form like apples, each containing the embryo of a goose, which, when the fruit was ripe, fell into the water; the other that geese were bred from a fungus growing on floating timber, in which they developed as a worm. The "fruit" and "worms" were quickly identified with barnacles that fastened themselves upon floating timber and trees, and many writers declared that they saw the birds inside the shells. Holinshed gravely affirms that such

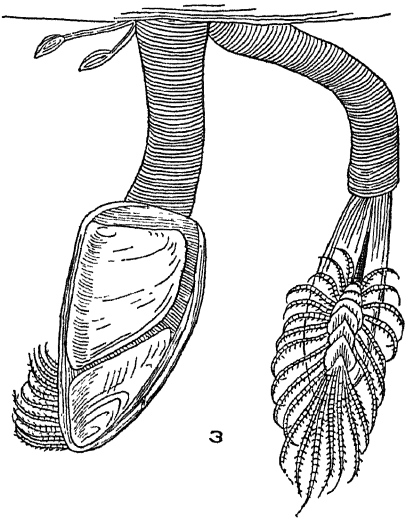
# BARNACLES



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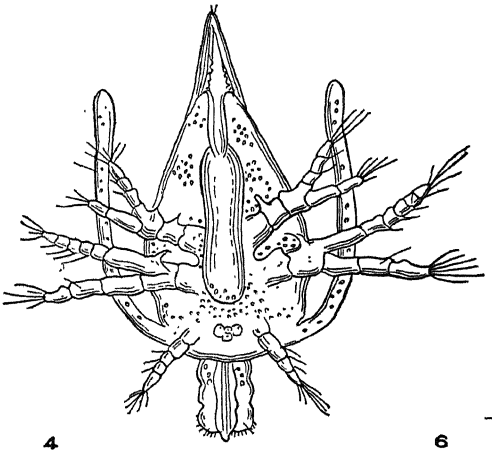

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6

1. SESSILE OR ACORN BARNACLE (Balanus).
2. PARTS OF A BARNACLE: *ss*, outer shell with its parts; *sc*, scutum; *t*, tergum; *o*, ovaries; *f*, feet; *a*, thoracic appendages.
3. GOOSE BARNACLE (Lepas anatifera).
4. EARLY LARVAL, OR "NAUPLIUS" STAGE OF A BARNACLE.
5. LATER LARVAL OR "CYPRIS" STAGE.
6. A MEDIÆVAL PICTURE OF THE SUPPOSED BIRTH OF GEESE FROM BARNACLES REPRESENTED AS FRUIT OF A TREE.

was the case; and the most learned men of their time were weak enough to give credence to the absurdity. Gerard, in his *Herbal* (1597), declares that after "a thing in form like a lace of silke finely woven, as it were, together"—which he correctly enough states to be "the first thing that appeareth" when "the shell gapeth open"—there next follow "the legs of the bird hanging out"; and at last the bird, increasing in size, "hangeth only by the bill," and "in short space after it cometh to full maturity, and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than a mallard, and lesser than a goose," etc. An illustration of the process, reproduced from one of the old *Herbals*, will be found on the Plate of BARNACLES.

All this was represented as constantly taking place on the coast of Lancashire and the Hebrides, while other writers reported the same fabulous birth of geese on the Continent.

One extraordinary and laughable result of this belief was the very learned discussion which took place among theologians as to whether the geese so born were flesh or fish. To the Jews it was important, because the ceremonial manner of killing would be different, if they were fowls, from that if they were fish. The Church wished to settle it in order to know if they might be eaten, as could fish, on Fridays and fast days. Very high dignitaries took part in the decision of the question, which in the case of the Church was favorable to their being eaten when meat was forbidden; and it has been suggested that the astonishing persistence of this myth was largely due to the selfish influence of the priests, based on regard for this privilege. What was the origin of so *bizarre* a story has been widely discussed. Many theories have been propounded, none of them satisfactory. The latest student of the matter, Mr. Henry Lee, of the Zoölogical Society of London, suggests that "barnacle" (or bernicle) as applied to the cirriped, and the same term as applied to the bird, have nothing to do with each other and originated separately. The former is probably a modified diminutive of the Latin *perna*, while the latter originated in the vernacular of Scotland. "To arrive at the origin of the word . . . we must remember," says Lee (*Sea Fables Explained*, London, 1883), "that this bird, *Anser leucopis*, was formerly called 'brent,' 'brant,' or 'bran' goose [see BRANT], and was supposed to be identical with the species (*Anser torquatus*) which is now known by that name. The Scottish word for 'goose' is 'clake,' or 'clakes,' and I think that the suggestion made long ago (Gesner, 1558), by his correspondent Joannes Caius, is correct, that the word 'barnacle' comes from 'branclakis,' or 'barn-clake'—the dark-colored goose. . . . I agree with Dr. John Hill (*History of Animals*, London, 1752), that the whole matter that gave origin to the story is that the 'shell-fish' (cirripedes) supposed to have this wonderful production . . . have a kind of fibres hanging out of them, which, in some degree, resemble feathers."

**BARNARD,** LADY ANNE (1750–1825). The author of the ballad, "Auld Robin Gray" (q.v.). She was born in Fifeshire, Scotland, the eldest daughter of James Lindsey, Earl of Balcarres. In 1793 she married Andrew Barnard, son of the Bishop of Limerick, and secretary to Lord Macartney at the Cape of Good Hope. There Lady Anne lived until 1807, when, on the death of her husband, she returned to London. Her *Letters*, which were published in 1901, are extremely vivacious and entertaining.

**BARNARD,** DANIEL DEWEY (1797–1861). An American lawyer, born in Sheffield, Mass. He graduated at Williams College in 1818, and in 1821 was admitted to the bar at Rochester, N. Y. He was a member of Congress in 1828–30 and 1839–45 and also served in the State Legislature. From 1849 to 1853 he was Minister to Prussia. He published numerous speeches and reviews.

**BARNARD,** EDWARD EMERSON, LL.D. (1857–1923). An American astronomer. He was born at Nashville, Tenn., graduated in 1887 at Vanderbilt University (Nashville), and in 1887–95 was astronomer at Lick Observatory, Mount Hamilton, Santa Clara Co., Cal. Subsequently he became professor of astronomy at the University of Chicago and astronomer of the Yerkes Observatory, Williams Bay, Wis. He received, in 1892, the Lalande gold medal of the French Academy of Sciences; in 1898 was elected a foreign associate of the Royal Astronomical Society of Great Britain; was awarded the Janssen gold medal by the French Academy of Sciences (1900); and the Janssen prize by the French Astronomical Society (1906). He obtained excellent results in celestial photography and discovered 16 comets and the fifth satellite of Jupiter. In 1902 he published *Micrometrical Observations of Eros Made during Opposition of 1900–1901*.

**BARNARD,** FREDERICK AUGUSTUS PORTER (1809–89). An American mathematician and educator. He was born at Sheffield, Mass., graduated at Yale in 1828, and in 1831 became teacher in the Hartford Deaf and Dumb Asylum. He was professor of natural philosophy, mathematics, and English literature in the University of Alabama from 1837 to 1848 and of chemistry until 1854, when he took orders in the Episcopal church. In 1855 he was professor of astronomy and mathematics in the University of Mississippi, in 1856 president of that institution, and in 1858 chancellor. He became president of Columbia College, New York City, in 1864, and throughout nearly a quarter-century labored with great success for its advancement. He was United States Commissioner to the Paris Exposition of 1867 and to that of 1878 and in 1869 published a report on machinery and industrial arts. He wrote a *Treatise on Arithmetic* (1830), *Analytical Grammar with Symbolic Illustrations* (1836), *Letters on College Government* (1854), *Collegiate Education* (1854), *Art Culture* (1854), *History of the United States Coast Survey* (1857), *University Education* (1858), *Recent Progress of Science* (1869), *The Metric System* (1871), and contributed very extensively to the educational periodicals of his day. In 1860 he was one of the party sent to Labrador to observe an eclipse of the sun; in 1862 he was at work on the reduction of Gillis's observations of the stars of the Southern Hemisphere, and in 1863 he superintended the publication of maps and charts of the United States Coast Survey. He was one of the incorporators of the American Association for the Advancement of Science and its president in 1860; one of the incorporators of the National Academy of Sciences in 1863; a member of the board of experts of the Bureau of Mines in 1865, and a member of the American Institute in 1872. In the latter year he was editor in chief of *Johnson's Universal Cyclopædia*. He left the bulk of his property

to Columbia College. Barnard College, affiliated with Columbia University, is named after him—so named because of the interest which President Barnard took in the higher education of women. Consult Fulton, *Memoirs of Barnard* (New York, 1896); Winship, *Great American Educators* (Chicago, 1900); Van Amringe, *A History of Columbia University* (New York, 1904); and Sherwood, "Columbia University" in United States Bureau of Education, *Circulars of Information*, 1900, No. 3.

**BARNARD,** GEORGE GREY (1863– ). An eminent American sculptor. He was born at Bellefonte, Pa., and derived his earliest training at the Art Institute of Chicago. He then studied for three years at the Ecole des Beaux-Arts, and for nine years in his own studio, in Paris. In 1894 he first exhibited at the Champs de Mars, upon which he was elected an associate of the Société Nationale des Beaux-Arts. In 1896 he removed to New York. The principal work of his early period is "The Two Natures," (1904), in the Metropolitan Museum of Art, New York. Other important productions are: "Sleeping Boy"; "Friendship" (a colossal group for a tomb in Norway); "The Hewers"; a clock-case, 12 feet high, carved in oak and illustrating Scandinavian mythology, a remarkable production; "Maidenhood," a marble of charming purity; the bronze "God Pan," on the green of Columbia University, New York; a large fountain in Tampa, Fla., and another at Cairo, Ill. His later commissions include the memorial of Governor Curtin and the soldiers of Centre County at Bellefonte, Pa., and the entire sculpture of the new State Capitol of Pennsylvania. Barnard was awarded gold medals at the Paris and Pan-American expositions and became professor of sculpture in the Art Students' League and an associate of the National Academy of Design. His work reveals a striking originality of conception and admirable technique, especially in marble. His sculpture, like the painting of Watts, is symbolic and idealistic. Consult Taft, *History of American Sculpture* (New York, 1903).

**BARNARD,** HENRY (1811–1900). An American educational reformer. He was born at Hartford, Conn., graduated at Yale in 1830, and was admitted to the bar in 1835. From 1837 to 1840 he was a member of the State Legislature, where his career was marked by his energy in behalf of school and prison reform. Later, as school commissioner of Rhode Island (1843–49), he manifested the same zeal and virtually revolutionized the educational system of that State. From 1850 until 1854 he was superintendent of the Connecticut State schools; during the same period principal of the State Normal School at New Britain; from 1857 to 1859 president of the University of Wisconsin from 1865 to 1866 president of St. John's College, Annapolis; and from 1867 to 1870 the first United States Commissioner of Education. He organized the Bureau of Education and in his reports suggested or advocated nearly all of the reforms that have since been carried out in our educational system. Dr. Barnard, while secretary of the Connecticut School Board (1832–42), and later while superintendent, published the *Connecticut Common School Journal* and, while in Rhode Island, the corresponding journal in that State. In 1855 he founded the *American Journal of Education*, continuing as editor and chief contributor until 1886, when he published the *American Library of Schools and Education*, a collection of his own treatises numbering over 800 and filling 52 volumes. Dr. Barnard is to be ranked with Horace Mann as one of the greatest of American educational pioneers. Consult A. D. Mayo, *Henry Barnard* (Washington, 1898), and W. S. Monroe, *Educational Labors of Henry Barnard* (Syracuse, 1893).

**BARNARD,** JOHN GROSS (1815–82). An American officer and military engineer. He was born in Sheffield, Mass., graduated at West Point in 1833, and was employed as constructing engineer until 1846, rising to the rank of colonel of engineers and brevet major general. In the Mexican War he fortified Tampico and in 1851 was chief engineer of the Tehuantepec Survey. He was superintendent of West Point from 1855 to 1856 and for four years was in charge of the defenses of New York Harbor. In the Civil War he served successively as chief engineer of the department of Washington, as chief engineer (with the rank of brigadier general) of the Army of the Potomac, and chief engineer of the staff of General Grant. At the close of the war he was brevetted major general "for gallant and meritorious services in the field," and in December, 1865, became colonel of the Engineer Corps. He subsequently was a member of the boards having charge of fortifications and river and harbor obstructions. He published, among other works: *Phenomena of the Gyroscope* (1858); *Dangers and Defenses of New York* (1859); *Notes on Sea-Coast Defense* (1861); *The Confederate States Army and the Battle of Bull Run* (1862). Consult *Biographical Memoirs of the National Academy of Sciences* (1905).

**BARNARD CASTLE.** A market town in the county of Durham, England, situated on the Tees, 15 miles northwest of Darlington. On a rocky promontory near the river are the ruins of a castle built in the thirteenth century by Barnard Baliol, an ancestor of John Baliol, King of Scotland. Its townhall is noteworthy, and here are also a museum and a number of manufacturing establishments. It has a large grain market. Pop., 1901, 4421; 1911, 4757.

**BARNARD COLLEGE.** The undergraduate college for women in the educational system of Columbia University (q.v.). The college proper was organized in 1889, as a result of the failure of President Barnard of Columbia and others to induce the trustees of Columbia College to admit women to that institution upon equal terms with men. The woman's college, then formed, had its own trustees and financial responsibility, but was closely affiliated with Columbia. The arrangement made at that time to exchange instructions was soon outgrown, and on Jan. 9, 1900, the following agreement was made: The president of the university to be ex officio president of Barnard and a trustee of Barnard; the internal administration of Barnard to be conducted under the direction of the president by its dean (Miss Virginia C. Gildersleeve, Ph.D., 1911– ), who is entitled also to a vote in the university council; Barnard to retain its separate corporate existence and board of trustees, to provide for its own financial support, and to maintain complete separate undergraduate instruction; all Barnard degrees to be granted by, and in the name of, Columbia. At first Barnard College had charge of the women post-graduate students of the university, but since 1900 these students have registered directly in the university.

Although, as originally organized, Barnard had no further financial resources than the promise of a number of persons to pay a small sum annually for four years, it has been able, through subsequent subscriptions, to meet all the expenses of a rapidly growing college. In 1889 there were 36 students; in 1891–92, 62; in 1901–02, 431; in 1906–07, 624, and in 1911–12, 845. The buildings of the college are on Broadway, adjoining those of the Columbia corporation, and include Milbank Hall, the gift of Mrs. A. A. Anderson; Fiske Hall, given by Mrs. Josiah M. Fiske; and Brinckerhoff Hall, built mainly by the gifts of Mrs. Van Wyck Brinckerhoff. In March, 1902, the endowment of the college was increased by $500,000, $250,000 being given by John D. Rockefeller and $250,000 being obtained through numerous other gifts. In 1903 Mrs. Anderson provided for the future development of the college by the gift of the land lying between Broadway and Claremont Avenue and 116th and 119th streets, now known as Milbank Quadrangle. From a fund of $50,000 given in 1902 by Mrs. Anderson, to which, in 1906, an unknown donor added $150,000, a dormitory, Brooks Hall, was erected on 116th Street, which is to be one of a series of five dormitories facing on Milbank Quadrangle. The endowment of the college is about $1,300,000; the value of the buildings and grounds, about $3,000,000. The gross income is about $200,000.

**BARNARDO,** Thomas John (1845–1905). An English philanthropist, born in Ireland. While engaged in the study of medicine at London Hospital in 1866, he became interested in the condition of destitute children and established a place of refuge for them in Commercial Road in 1867. Since then 112 of these homes and many mission branches had been opened in various parts of England, Canada, and the Island of Jersey at the time of his death. In the "Village Home" at Ilford, Essex, about 65 cottages have been erected. These are under the supervision of "mothers," and girls are reared here as if they were in their own homes. There is also an emigration agency, which provides for the transportation of young people to Canada, where they are furnished with employment. In this way more than 60,000 orphan waifs have been rescued and instructed. Among the publications of Barnardo are: *Something Attempted, Something Done;* and *The Rescue of the Waif.* Consult J. H. Batt, *Dr. Barnardo: the Foster-father of "Nobody's Children"* (London, 1904); also a biography by his wife (1907).

**BARNARD'S INN.** An inn of Chancery, in London, dating back to 1451. It was destroyed in the last decade of the nineteenth century to make room for modern buildings.

**BARNATO,** Barnett (1852–97). An English speculator, the so-called "King of the Kaffirs," commonly known as Barney Barnato. He was born in London, of Hebrew parentage. Early in his career he was connected with a circus and with traveling theatrical companies. In 1873 he went to Kimberley, South Africa, and in 1895 organized a remarkable "boom" in Kaffir mining stock. He was credited with being one of the richest men in the world and the most successful promoter of financial schemes. He committed suicide in 1897 by jumping from a vessel at sea. Consult Isaacs, *Life of Barnett Barnato* (London, 1897).

**BARNAUL,** bär'nȧ-o͞ol'. The capital of a district in the government of Tomsk, Siberia, on the left bank of the upper Ob, 238 miles southwest of Tomsk, and 2046 miles east-southeast of Moscow (Map: Asia, H 3). It is the chief town and the administrative seat of the personal domains of the Czar in the Altai, and contains the Imperial smelting works, the annual output of which exceeds 13,000 pounds of gold and 5000 pounds of silver (troy). The district is rich in minerals, producing large quantities of lead, copper, iron, and silver. Barnaul's notable institutions are a meteorological station, founded in 1838, a well-equipped mining school and library, a mint, and a public museum, with fine zoölogical and botanical collections. Pop., 1897, 29,408.

**BARNAVE,** bär'nȧv', Antoine Pierre Joseph Marie (1761–93). A champion and victim of the French Revolution. He was born at Grenoble, the son of an advocate. He adopted his father's profession and early attracted attention in the Parlement of Grenoble by the talents which he displayed. A pamphlet which he published against the feudal system led to his being returned as deputy from his province to the States-General in 1789. He zealously advocated the proclamation of the Rights of Man, was vehement in opposition to the absolute veto, carried through the confiscation of church property to the use of the nation, the emancipation of the Jews, and the abolition of the religious orders, and was mainly instrumental in the liberation of the slaves and reorganization of the colonies. He was the leading member of the Jacobin Club for the first two years of its existence. As a leader of the extreme party in the earlier stages of the Revolution, he became the idol of the people, particularly after his victory over Mirabeau in the question of the power of peace and war, which Mirabeau wished to leave with the King, and Barnave successfully claimed for the National Assembly. With Pétion and Latour-Maubourg he was sent to bring the royal family back from Varennes, where they had been intercepted on their flight to the border. It may be that personal contact with royalty softened his prejudices; but certainly it is true that he subsequently became inclined to a more moderate course, defended the inviolability of the King's person, and resisted the assertion by the National Assembly of power to remove ministers. This conduct led to his being regarded as a renegade from the National party. He retired to his native place on the dissolution of the National Assembly, but after the 10th of August, 1792, he was impeached, with Lameth and Duport-Dutertre, on account of correspondence with the court; was brought to Paris, tried before the Revolutionary tribunal, condemned, and guillotined on the 29th of November, 1793. Consult Janin, *Barnave* (Paris, 1860).

**BARNAY,** bär'nī, Ludwig (1842– ). A German actor, born at Pesth. He made his début in 1860 at Trautenau and appeared in his native city the following year, after which he had engagements of varying length in Gratz, Mainz, Vienna, Prague, Riga, Mainz again, Leipzig, and Weimar. From 1870 to 1875 he was at the Stadt-Theater of Frankfort-on-the-Main, and for the next five years at that of Hamburg, where he acted as director. For several years thereafter he traveled as a "star," visiting London with the Meiningen Court Company in 1881, and in 1882 making a successful tour in the United States. From 1887 to 1894 he managed

his Berliner Theater in Berlin. He has since made his home in Wiesbaden. Barnay's greatest talents have been shown in tragedy. Among his most noted rôles are Essex, Uriel Acosta, Othello, Antony, Tell, and Egmont. He was the leader in the movement which assembled the stage congress at Weimar in 1871, thus being founder of the "Association" (*Bühnengenossenschaft*), which has proved of such value to the German theatrical profession.

**BARN'BURN'ERS.** In American political history, a faction of the Democratic party in New York State after 1844, so called (in allusion to a Dutchman who was said to have burned his barn to free it of rats) from their supposed eagerness for radical reform measures, especially for such measures as would prevent the extension of slavery in the Territories. Unable to secure satisfactory recognition in the Democratic National Convention of 1848, they joined the Free-soilers, and with them nominated Van Buren for the presidency. Their vote, dividing the Democratic strength, secured the election of Taylor, the Whig nominee. In 1852 they reunited with their opponents, the Hunkers, though the two factions did not work together in harmony until several years later. Before this time the name "Softs," or "Soft-shells," had replaced the name "Barnburners." See VAN BUREN, MARTIN; HUNKERS; ALBANY REGENCY.

**BARN'BY,** SIR JOSEPH (1838–96). An English musician and composer. He was born at York, England, and was educated at the Royal Academy of Music. He was organist at St. Andrew's and St. Ann's, was conductor of the oratorio concerts at St. James's and Exeter Halls; succeeded Gounod as conductor of the Royal Albert Hall Choral Society in 1872; became musical director at Eton College in 1875, and afterward was elected principal of the Guildhall School of Music. In 1892 he was knighted. Among his numerous and popular compositions the motet, *King All Glorious,* and his oratorio, *Rebekah,* and *The Lord is King*—a setting of the 97th Psalm—are especially noteworthy.

**BARN'DOOR' SKATE.** The largest of North American skates (*Raja lævis*). It occurs along the Atlantic coast from New England to Florida, and may reach a length of 4 or 5 feet. See SKATE.

**BAR'NEGAT BAY.** An inlet of the Atlantic, in Ocean Co., N. J., extending from Bayhead to New Inlet. It is 27 miles long and 1 to 4 miles wide. It is separated from the ocean by Island and Long beaches. On the north end of the latter is Barnegat City (Map: New Jersey, D 4). The beaches are separated by Barnegat Inlet, about 1 mile wide. At the mouth is a lighthouse, 39° 45′ 52″ N., 74° 6′ 24″ W., with a light 163 feet above sea level, flashing white every 10 seconds and visible 19 nautical miles.

**BARNES,** ALBERT (1798–1870). An American Presbyterian theologian. He was born at Rome, N. Y.; graduated at Hamilton College and the Princeton Theological Seminary. He was pastor of the First Presbyterian Church, Philadelphia, from 1830 to 1867, and is best known for his *Notes* on the Bible. Of the *Notes on the New Testament* over a million copies were sold. During the disruption of the Presbyterian church he was tried for heresy and in the final separation went with the New School and was among the most liberal of its leaders. Besides the *Notes,* he wrote an introduction to *Butler's Analogy; Scriptural Views of Slavery* (1846); *The Way of Salvation* (1863); *Lectures on the Evidences of Christianity in the Nineteenth Century* (1868), and a series of Sunday-school manuals. A collection of his *Theological Works* was published in Philadelphia (1875).

**BARNES,** ALFRED SMITH (1817–88). An American publisher, born at New Haven, Conn. He entered the publishing business in Hartford, Conn., at an early age, and afterward went to New York (1838) and there published many of Professor Davies's mathematical works. He lived in Philadelphia from 1840 to 1845 and then settled permanently in New York and undertook the publication of schoolbooks. At his death Mr. Barnes left nearly $100,000 to educational and charitable institutions, $45,000 of it going to the construction of Barnes Hall, the home of the Christian Association of Cornell University.

**BARNES,** BARNABE (c.1569–1609). An Elizabethan lyrist, son of Dr. Richard Barnes, Bishop of Durham. He was educated at Oxford, was with Essex in Normandy against the Prince of Parma (1591), and took the side of Gabriel Harvey in the quarrel with Thomas Nash. In 1593 Barnes published a volume containing much beautiful verse, *Parthenophil and Parthenophe: Sonnettes, Madrigals, Elegies, and Odes* (reprint by Arber in *English Garner,* 1882); *A Divine Centurie of Spirituall Sonnets* (1595; ed. by Grosart, 1875) is less interesting. His rather remarkable and somewhat *outré* tragedy, *The Divil's Charter,* was performed before King James at Christmas, 1606–07.

**BARNES,** CHARLES REID (1858–1910). An American botanist, born at Madison, Ind. He received his education at Hanover College and subsequently studied botany at Harvard. In 1880 he was made professor of natural history at Purdue University and in 1886 professor of botany at the University of Wisconsin. In 1898 he became professor of plant physiology at the University of Chicago. He was made vice president of the American Association for the Advancement of Science in 1899 and president of the Botanical Society of America in 1903. Besides editing the *Botanical Gazette,* he wrote: *Handbook of Plant Dissection* (jointly with J. M. Coulter and J. C. Arthur, 1886). *Keys to the Genera and Species of North American Mosses* (1st ed., 1890; 2d ed., jointly with F. D. Heald, 1897); *Plant Life* (1898); *Outlines of Plant Life* (1900); *Textbook of Botany* (jointly with J. M. Coulter and H. C. Cowles, 1910); and a number of valuable papers on botanical subjects.

**BARNES,** EARL (1861– ). An American lecturer and educator, born at Martville, N. Y. He received the degree of A.B. from Indiana University in 1889 and that of M.S. from Cornell two years later. In 1890–92 he was professor of European history at Indiana University, and from then until 1897 he held the chair of education at Leland Stanford, Jr., University. Subsequently he devoted his time to lecturing and writing. Among his books are: *Studies in Education,* vol. i (1889), vol. ii (1902); *Studies in American History* (1896); *Woman in Modern Society* (1912).

**BARNES,** HOWARD TURNER (1873– ). A Canadian physicist. He was born at Woburn, Mass., but went to Canada with his parents in 1879. An early private education was succeeded by a course at McGill University, from

which he graduated in 1893. His research work in physics was recognized by the Royal Society, London, in 1898, when he was awarded the Joule studentship by that institution. He was appointed Macdonald professor of physics in McGill University in 1908, succeeding in that position Ernest Rutherford. The formation of ice in flowing water, and the ice problem considered with reference to engineering work in Canada were investigated by him. He invented improvements in thermometer construction, perfected a pyrometer which is used in the regulation of furnaces in factories, and he published *Ice Formation and Frazil* (1910).

**BARNES,** JAMES (1806–69). An American soldier, born in Boston, Mass. He graduated at the United States Military Academy in 1829 and was assistant instructor in French there in 1829–30. Subsequently he was in garrison at Forts McHenry (Md.) and Monroe (Va.). With the rank of first lieutenant of artillery he resigned and was engaged in railway engineering from 1836 to 1857. During the Civil War he served in 1861–62 as colonel of the Eighteenth Massachusetts Volunteers in the defenses of Washington, and with the Army of the Potomac in the Virginia Peninsular campaign and the Maryland campaign. As a brigadier general of volunteers he was at the battles of Fredericksburg and Chancellorsville and commanded a division at Gettysburg. He was brevetted major general of volunteers in 1865 for meritorious services.

**BARNES,** JAMES (1866– ). An American author. He was born at Annapolis, Md., and graduated at Princeton in 1891. He was with *Scribner's Magazine* for some time, in 1894–95 was assistant editor of *Harper's Weekly;* from 1899 to 1901 was war correspondent for *The Outlook* in South Africa; and from 1905 to 1908 was editor of *Appleton's Booklover's Magazine.* He wrote: *Naval Actions of the War of 1812* (1896); *Yankee Ships and Yankee Sailors* (1898); *David G. Farragut* (1899); *Drake and his Yeomen* (1899); *The Giant of Three Wars* (1903); *The Blockaders* (1905); *Outside the Law* (1906); *The Clutch of Circumstance* (1908); *Rifle and Caravan* (1912).

**BARNES,** JOSEPH K. (1817–83). An American surgeon. He was born in Philadelphia, Pa., and was educated at Harvard and the University of Pennsylvania. In 1840 he joined the United States army as an assistant surgeon, and at the close of the Civil War was surgeon-general, being brevetted major general (1865). To him was due a large part of the efficiency of the medical department during the war. He was the founder of the Army Medical Museum and the library of the surgeon-general's office. He attended Presidents Lincoln and Garfield on their deathbeds.

**BARNES,** JOSHUA (1654–1712). An English classical scholar, born in London. In 1695 he was appointed Regius professor of Greek at Cambridge. Among his best-known works are: *Geranía; or, A New Discovery of a Little Sort of People Called Pygmies* (1675), which is said to have furnished to Swift some hints for his *Voyage to Lilliput;* and *Ἀνλικοκάτοπτρον* (1679), a Greek paraphase of the biblical story of Esther. His editions of Greek authors—Euripides, Anacreon, Homer—are no longer used.

**BARNES,** LADY JULIANA. See BERNERS, LADY JULIANA.

**BARNES,** THOMAS (1785–1841). An English editor. He was a schoolfellow of Leigh Hunt at Christ's Hospital, graduated in 1808 at Pembroke College, Cambridge, and wrote for the London *Examiner* a series of articles published over the signature "Criticus." In 1817 he became editor of the London *Times,* which he established as the foremost of English newspapers. He was a friend of Hunt, Lamb, and Hazlitt; and, as director of the political policy of the *Times,* wielded great influence. "Barnes," says Leigh Hunt in his *Autobiography,* "wrote elegant Latin verse, a classical English style, and might assuredly have made himself a name, in wit and literature, had he cared much for anything beyond his glass of wine and his Fielding."

**BARNES,** WILLIAM (1801–86). A poet and philologist, born at Rushay, Bagber, Dorsetshire. He was for many years master of the grammar school at Dorchester. He was ordained in 1847 and was promoted from the curacy of Whitcombe to the rectory of Winterbourn-Came, in Dorset, in 1862. In the meantime he received the degree of B.D. from Cambridge. He died Oct. 7, 1886. He is the author of three collections of poems written in the dialect of Dorsetshire: *Poems of Rural Life, with a Dissertation and Glossary* (1844); *Homely Rhymes* (1859); and *Poems of Rural Life* (1893). He wrote also a collection called *Poems of Rural Life in Common English* (1868), which contains many attractive pieces. As a philologist, Barnes attempted to restore the ancient English speech. In his *Outline of English Speechcraft* (1878) he substituted for the usual grammatical nomenclature English compounds of his own coining. "Tenses" became *time-takings;* "adjectives," *mark-words;* and "grammar," *speechcraft.* Consult Lucy Baxter, *Life of William Barnes* (New York, 1887).

**BARNES,** WILLIAM, JR. (1866– ). An American politician. He was born in Albany, N. Y., and graduated from Harvard University in 1888. In the following year he became owner and editor of the *Albany Evening Journal.* He took an aggressive interest in Republican politics, his forceful personality soon making him one of the leading political figures in New York State. In 1892 he became a member of the Republican State Committee, and in 1911 he was elected its chairman. Without being the holder of an elective office, or at any time a candidate for such an office, he virtually directed the course of the Republican party in New York until 1912, when the organization split into progressive and conservative sections. Identifying himself with the conservative wing, Barnes became a delegate to the 1912 National Convention of his party, and there bitterly opposed the attempt to make Theodore Roosevelt Republican candidate for the presidency. After the Democratic landslide of the following autumn he continued to control the "machine" of the regular Republican party in New York.

**BARNESBORO.** A borough in Cambria Co., Pa., 40 miles west by north of Altoona, on the Pennsylvania Railroad (Map: Pennsylvania, D 6). It is in a coal-mining district and has lumber yards, bottling works, and an ice-cream factory. The borough contains a theatre and several hotels and owns its water works. Pop., 1900, 1482: 1910, 3535.

**BARNESVILLE.** A town in Pike Co., Ga., 60 miles south by east of Atlanta, on the Central of Georgia Railroad (Map: Georgia, B 2). Barnesville is the seat of Gordon Institute and has a Carnegie library. It carries on a trade in

cotton and manufactures buggies. Pop., 1910, 3068.

**BARNESVILLE.** A city in Belmont Co., Ohio, 30 miles west by south of Wheeling, W. Va., on the Baltimore and Ohio Railroad (Map: Ohio, H 6). It manufactures glass, car wheels, cigars, bottles, shirts and overalls, and boxes. Barnesville was settled in 1800 and was first incorporated about 1836. The government is vested in a mayor, elected biennially, and a council. The water works are owned and operated by the city. Pop., 1910, 4233.

**BAR'NET.** A town in Hertfordshire, England, 11 miles north-northwest of London. Near the town is the site, marked by an obelisk, of the famous battle, fought April 14, 1471, between the Yorkists and Lancastrians, in which the latter, after a desperate struggle, were routed, and their leader, Warwick, "the king-maker," killed. An annual cattle fair is held here. Pop., 1891, 6400; 1901, 8359; 1911, 10,440.

**BAR'NETT,** JOHN (originally, BEER) (1802–90). An English composer, born at Bedford. After studying under various masters he early wrote a considerable number of songs and ballads, of which the best was the setting for the Rev. Charles Wolfe's "Burial of Sir John Moore." In 1834 appeared his *Lyrical Illustrations of the Modern Poets*, a song collection of unusual merit; and in the same year his opera, *The Mountain Sylph*, was presented in London. With the latter, many mark the beginning of the movement toward the founding of an English school of dramatic music. His *Fair Rosamond*, performed in 1837, failed, through the absurdities of the libretto, of any marked success. Others of his publications are an oratorio, *The Omnipresence of the Deity* (1830), and a *School for the Voice* (1844).

**BARNETT,** JOHN FRANCIS (1837–1916). An English musician and composer, born in London. He studied at the Royal College of Music, London, and the Leipzig Conservatorium; played at a Gewandhaus concert, Leipzig, in 1861, and first attracted attention as a composer by his symphony in A minor, performed in 1864 by the Musical Society of London. His most important work is the cantata, *The Raising of Lazarus*, given for the first time at the Hereford festival of 1876. He became a professor in the Guildhall School of Music and in the Royal College. Among his other works are the cantatas *The Ancient Mariner*, written for the Birmingham festival of 1867, and *Paradise and the Peri*, for that of 1870; *The Lay of the Last Minstrel*, for orchestra; quartets and quintets for strings; and several pianoforte and vocal solos.

**BARNEVELDT,** bär'ne-vělt, JAN VAN OLDEN (1547–1619). A Dutch statesman. He was born at Amersfoot, in Utrecht, and at an early age showed great ardor in the cause of his country's independence. He was an able ally of William the Silent in the struggle against Spain, and after the Prince's death succeeded, through wise alliances with England and France, in preserving the independence so dearly gained. As Advocate-General of the Province of Holland, he proved equally his insight into public affairs and his address in diplomatic negotiations. Penetrating the secret designs of the young Prince Maurice of Orange, whom he had caused to be made stadtholder of five provinces, he made himself the leader of the Republican party, which aimed at subordinating the stadtholder to the Legislature and saving the Netherlands from a monarchy. It was he, also, who opposed the warlike tendencies of Maurice and concluded a treaty with Spain (1609) which later saved the country from the horrors of the Thirty Years' War. The country was at that time split up into the rival factions of the Arminians or Remonstrants, who stood for the doctrine of Free Will and comprised the magistracy of the country, with Barneveldt at their head, and the Calvinists, who were known as Gomarists or Contra-Remonstrants, of whom Maurice for political reasons now assumed the leadership. With the view of obviating a civil war, Barneveldt caused an ecclesiastical assembly to be called, which established general toleration. The states at first concurred in this wise measure, but the partisans of the Orange faction brought about a change of views by representing the Remonstrants as secret friends of Spain. Barneveldt was attacked in scurrilous publications and was insulted, even in the meetings of the states, by the mob whose idol Maurice was. The strife between the Remonstrants and the Gomarists, i.e., between Barneveldt and Maurice, finally culminated in violence on the part of the Prince of Orange. On Aug. 29, 1618, Barneveldt was illegally arrested, together with Grotius and Hoogerbeets, and thrown into prison. In November Maurice procured the summoning of the Synod of Dort (q.v.), which condemned the Remonstrants with the utmost rigor. In March, 1619, while the Synod was still sitting, Barneveldt was brought to trial before a special commission of 24 judges, unlawfully appointed, who condemned as a traitor the innocent man to whom the country owed its political existence. The friends of Barneveldt, the Princess of Orange, and the French Ambassador interceded for him in vain. On May 13, 1619, the venerable man was executed. Four years after their father's death, Barneveldt's two sons, Wilhelm and Reinier, took part in a conspiracy against the life of Maurice. The conspiracy was discovered; Wilhelm escaped, but Reinier was seized and beheaded. Consult Motley, *Life of Barneveldt*, of which numerous editions have been published (London and New York, 1874).

**BAR'NEY,** JOSHUA (1759–1818). An American naval officer, born in Baltimore, Md. He shipped in 1772 in a brig trading to Liverpool and subsequently made several voyages to Europe. At the outbreak of the Revolutionary War he was appointed master's mate on board the sloop-of-war *Hornet*, which was assigned to Commodore Hopkins's squadron and participated in the capture of New Providence, Bahamas. Subsequently he entered on board the schooner *Wasp* and served on the sloop *Sachem*, the brig *Andrea Doria*, and the frigate *Virginia*. He was captured by the British in 1780 and sent to Mill Prison, Plymouth, England, whence he made his escape in 1781 and came to Philadelphia. In 1782, in command of the *Hyder Ali*, he captured off Cape May the British ship *General Monk* and in the same year sailed for France with dispatches to Franklin, then United States Minister, concerning the peace negotiations. From 1795 to 1800 he was a commodore in the French service; in 1814 commanded the American flotilla in defense of Chesapeake Bay, and in the same year participated in the battle of Bladensburg. Consult Barney, *A Biographical Memoir* (Boston, 1832).

**BARN'FIELD,** RICHARD (1574–1627). An English poet, born at Norbury, Shropshire. His

works include *The Affectionate Shepherd*, a pastoral based on Vergil's Second Eclogue (1594); *Cynthia, with certain Sonnets and the Legend of Cassandra* (1595); and *The Encomion of Lady Pecunia*, etc. (1598). The last volume contains "If music and sweet poetry agree," and "As it fell upon a day," which were long attributed to Shakespeare. They were again printed in *The Passionate Pilgrim* (1599). Barnfield's poems were edited by Grosart for the Roxburghe Club (1876), and by E. Arber (1882).

**BAR'NIVELT,** ESDRAS, APOTHECARY. The pseudonym of the author of a key to *The Rape of the Lock*. The "key" has been ascribed both to Pope and to Arbuthnot and was published in London in 1715.

**BARN OWL.** The barn owl is a familiar species named by Linnæus *Strix flammea*, and conservative ornithologists regard it as almost cosmopolitan in its distribution, counting the slight differences observable in those of Africa, the Orient, Australia, North and South America, as marking merely geographical races; others, however, prefer to separate these local forms into distinct species, and call that of the Americas *Strix pratincola*. The scientific terminology of many of the owls is still an unsettled matter, and while the American ornithologist speaks of his barn owl as *Aluco pratincola*, his British colleague insists on *Tyto alba*. The common names are not free from dispute, and in England the term "barn owl" is most often applied to the related tawny owl (*Strix stridula* or *aluco*), while the present species is usually called "screech owl." This type of owl is of comparatively small size (length, about 17 inches) and is characterized by the yellowish-red, irregularly marked plumage of the back; the "silky-white to bright tawny" hue of the under surface, dotted with black spots; and particularly by the heart-shaped form of the facial disks, which meet in a point below the beak and are fringed with bright rust color. The eyes are small and black, the legs long and clothed with short feathers only. Its quaint physiognomy has won for it the name "monkey-faced" in the Southern States.

*Range and Breeding.*—This owl is occasionally seen over most of the United States, but is most numerous in the southern portion and thence to Patagonia. It seems to be partly migratory, retreating in winter from its most northerly ranges. In the Old World it breeds mainly in church towers, ruins, and similar places, and its eerie hoot has contributed much to the poetry and fables connected with its race; but in less civilized or less ruinous parts of the world it chooses for a nesting place a cavity in an old tree, a crevice among rocky crags, or (as very frequently in the southwestern United States) a niche in some steep earthen bank. Even in the United States, however, it makes its home in belfries and stone buildings when it can. The nest is a bed of straw and feathers, and the eggs, 4 to 8, are white. "This owl," Fisher remarks, "is one of the most distinctively nocturnal of the tribe, but like all the others it can see perfectly well in the brightest daylight, when for any reason it is required to leave its retreat. It usually sleeps during the day, sitting upright in a dark nook or crevice, in the shadow of a bridge, or among the dense foliage of some grove or reedy marsh."

*Food and Economic Value.*—This species is perhaps the most beneficial of its tribe to the agriculturist, because its food consists almost wholly of the small rodents so injurious to him. Naturalists recognize this in all parts of the world. In the United States this owl subsists in the East mainly on rats and wild mice; in the South on the cotton rat, and certain mice doing great injury there; and in the West on gophers, ground squirrels, and rabbits, even those so large as the jack rabbit. Its services in the destruction of cotton rats and pouched gophers alone would entitle it to gratitude and protection. Consult Fisher, *Hawks and Owls of the United States* (Agric. Dept., Washington, 1893). See OWL, and Plate of OWLS.

**BARNSLEY.** A town in the West Riding of Yorkshire, England, about 21 miles north of Sheffield, on the Dearne (Map: England, E 3). Although the town is of great antiquity, most of its buildings are of a comparatively recent date. It was incorporated in 1869 and maintains public libraries, baths, and markets. It has a large number of educational and benevolent institutions and a public park of about 20 acres. It is situated within the coal district and has manufactures of linen, paper, glass, and steel wire. There are also iron and steel foundries, grain and saw mills, breweries, and dyeing works. It is on four railway lines and a canal, which facilitates its export of coal, mainly to Hull and London. The United States has a resident consular agent. Pop., 1891, 35,000; 1901, 41,000; 1911, 50,614. Barnsley dates from pre-Norman times. Consult Jackson, *History of Barnsley* (London, 1858).

**BARNSTABLE,** bärn'stȧ-b'l. A town and the county-seat of Barnstable Co., Mass., 73 miles by rail southeast of Boston, on Barnstable Bay, and on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, G 4). It contains 12 villages, several of which are well-known summer resorts, and is principally engaged in boat building, oyster fishing, and cranberry cultivation. Within the town limits are several public libraries and a State normal school. Barnstable was first settled in 1639. In the part called West Barnstable, James Otis, Sr., lived, and James Otis, Jr., was born. The government is administered by town meetings. Pop., 1900, 4364; 1910, 4676. Consult "Annals of Barnstable," in Freeman's *History of Cape Cod* (Boston, 1860–69).

**BARNSTAPLE,** bärn'stȧ-p'l (locally known as Barum). A town in Devonshire, England, on the Taw, 6 miles from its mouth and 34 miles northwest of Exeter (Map: England, B 5). The Taw is here crossed by a bridge said to have been built in the thirteenth century. It consists of 16 arches and has been widened by ironwork on each side. Its noteworthy buildings are a parish church, dating from the fourteenth century; the old grammar school, at which the poet John Gay was educated; and some quaint old houses in Bontport Street. Before the silting of the river Barnstaple was a seaport of some importance. It has manufactures of lace, leather, gloves, and pottery, known as "Barum-ware," and there are shipyards, saw mills, and foundries. Barnstaple has existed since the reign of Athelstan, in the tenth century, who built a castle here, but was incorporated in the reign of Henry I. Pop., 1891, 13,000; 1901, 14,137; 1911, 14,485.

**BARN SWAL'LOW.** Two distinct species of swallow frequent barns and outbuildings in North America, but that to which the name

properly applies, and should be restricted, is the fork-tailed one which makes its nest inside the building, while the other, square-tailed one, which nestles on the outside of the walls, should be called cliff or eaves swallow. The barn swallow proper, then, is the one named by naturalists *Hirundo* or *Chelidon erythrogastra*, and it is among the most widely familiar birds of the whole continent. It is lustrous blue above, and below is pale reddish-brown, with the forehead, chin, and throat bright chestnut, bounded by a collar-like band of blue across the breast; the tail is deeply forked, and each tail feather, except the central pair, has a white spot on its inner web. These swallows arrive from the south, where they have wintered in the tropics, in May.

*Nesting Habits.*—Before the country was civilized, these swallows frequented only such parts of it as had rocky exposures, and they made their nests in niches on the face of a cliff, as they yet do in some remote parts of the western mountains. As soon, however, as stables and sheds were erected by white settlers, the swallows took possession, and this increasing and welcome acquaintance with man has continued as civilization pushed west and north, until now a barn-swallow dwelling in aboriginal fashion is a curiosity. The nest is composed of pellets of mud plentifully mixed with straw, and may sit flat upon a frame beam at a safe height, when it is a simple cup; or it may be plastered, in the form of a hollow bracket, against the rafters or higher walls. Invariably, however, the nest of this species is *inside* the barn or shed. It is bedded with soft grass and feathers and contains five rather elongated, buffy-white eggs, spotted about the large end with reddish and purple dots and splashes. These birds are not only perfectly harmless, but they consume a vast number of small insects which are more or less injurious or annoying. It is most unfortunate, therefore, that they seem an object of especial attack by the English sparrows, which not only seize upon many nests for their own breeding purposes, but wantonly tear many others to pieces, destroying eggs and young as if in a spirit of mere malicious mischief. In this way the barn swallows of the more northerly States and eastern Canada have been greatly reduced and in some places exterminated. They depart for the south in flocks earlier in the autumn than do most other migrants. See SWALLOW and Plates of SWALLOWS and of EGGS OF SONG BIRDS.

**BAR'NUM,** PHINEAS TAYLOR (1810–91). An American showman, born at Bethel, Conn. His father was a tavern keeper, and while attending the village school, Barnum traded with and played practical jokes upon his father's customers. At the age of 13 he was employed in a country store and at 18 went largely into the lottery business. When only 19, he married clandestinely and moved to Danbury, where he edited *The Herald of Freedom* and was imprisoned 60 days for a libel. In 1834 he removed to New York, where, hearing of Joyce Heth, alleged nurse of Washington, he bought her for $1000, and with the aid of forged documents and puffing exhibited her to considerable profit. Reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until he bought the American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid, made of a fish and a monkey, also a white negress, a woolly horse, and finally a noted dwarf, styled "General Tom Thumb," whom he exhibited also in Europe in 1844. In 1847 he offered Jenny Lind $1000 a night for 150 nights. The tickets were sold at auction, a single ticket bringing in one case as much as $650; and his gross receipts for 95 concerts were over $700,000. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations, one of which, a clock factory, made him bankrupt. Settling with his creditors in 1857, he engaged anew in his career of audacious enterprises and made another fortune. Two of his museums having been destroyed by fire, in 1865 and 1868, he established in 1871 his "Greatest Show on Earth," a traveling circus and menagerie, with many new features. He was an unsuccessful candidate for Congress in 1866, but was four times elected to the Connecticut Legislature. His *Autobiography* (1854, since greatly enlarged) has at least the merit of frankness. In 1865 he published *The Humbugs of the World*, and in 1869 *Struggles and Triumphs*.

**BARN'WELL,** ROBERT WOODWARD (1801–82). An American statesman. He was born at Beaufort, S. C., graduated at Harvard in 1821, and was admitted to the bar. He was in Congress from 1829 to 1833, and was Senator in 1850–51. After the secession of the Southern States he was sent as a delegate to the famous Montgomery Convention and cast the decisive vote in the election of Jefferson Davis. He was also a member of the Confederate Senate and was twice president of the University of South Carolina.

**BAROACH,** bâ-rōch'. A town in India. See BROACH.

**BAROCCHIO,** bâ-rōk'kē-ō, **BAROZZIO,** or **BAROZZI,** GIACOMO DA VIGNOLA. See VIGNOLA.

**BAROCCI,** bâ-rōt'chē, or **BAROCCIO,** -chō, FEDERICO (1528–1612). An Italian painter of the late Renaissance. He was born at Urbino and received his early training with his father, a sculptor, and from the painter Battista Franco. He then studied the works of Raphael at Rome, but was influenced less by these than by the paintings of Correggio. Upon his return to Urbino he executed many paintings, which survive for the most part in the churches of that city, the most important of these being "St. Sebastian," in the cathedral. Notwithstanding the flattering invitations of the Grand Duke of Tuscany, the Emperor Rudolph and Philip II of Spain, Barocci continued to reside in his native city. On a later visit to Rome he was employed in the decoration of the Belvedere in the Vatican, but during all the rest of his life suffered from the effects of a poison administered at that time by jealous rivals. Among his most important paintings at Rome is the "Burning of Troy," in the Borghese Palace; others are in the Vatican Collections and in the galleries of Florence. His "Christ Crucified," painted for the Doge of Genoa and now in the cathedral, is reputed his finest work. Barocci's importance consists in his opposition to the mannerism of his day, and in his careful drawings, his comparative fidelity to nature, and, above all, his emphasis on color. Consult R. H. Krommes, *Studien zu Federigo Barocci*, with bibliography (Leipzig, 1912).

**BAROCCO,** bâ-rōk'kō, or **BAROQUE,** bâ-rōk' (It. *Barocco*, Fr. *Baroque*, Sp. *Barrueco*). The origin of the word is uncertain, but in general it means 'irregular, imperfect.' In the fine arts the word applies to the last phase of the classic

revival in Italy and its derivatives elsewhere. The tendency of taste from 1560 on was away from classic refinement and restraint toward ostentation and restlessness, and all the arts underwent a profound change of spirit and expression. Much of the work was showy, meaningless, even vulgar, though redeemed occasionally by brilliancy and power.

In architecture, of the three great contemporaries, Vignola (1507–73), Palladio (1518–80), and Michelangelo (1475–1564), Vignola represents the still dominant classical refinement; Palladio the early symptoms of the new taste in his works at Vicenza; and Michelangelo in his work at St. Peter's, his sculptures of the Medici tombs at Florence, in his Sistine frescoes, and in his eccentric Porta Pia at Rome, displays an impatience of precedent and a striving after novel effects and powerful expression which, carried to an extreme by less masterly successors, became characteristic of architecture until late in the eighteenth century. Of these successors Lorenzo Bernini was the most gifted, both as architect and sculptor. His great colonnades in front of St. Peter's are magnificent, in the finest antique Roman spirit; but his baldachin in the same church is a huge structure of bronze in the worst possible taste. Carlo Maderno, or Maderna (1556–1629), in his façade of St. Peter's and F. Borromini (1599–1667) in his church of Sta. Agnese on the Piazza Navona, and both of these in other works, display the Baroque tendency to the extreme. Characteristic of all these works is a predilection for "colossal" orders—pilasters and columns running through two or more stories, with consequent bigness of scale in all the details; for large consoles and brackets, for broken, interrupted, and contorted entablatures and pediments, and for façades whose plans are bent in and out by multiplied curves and angles; in short, for large, even coarse details and agitated and broken lights and shadows and silhouettes. In interiors the use of stucco even for sculpture, of dark-colored marbles and showy inlays of *pietra dura* (q.v.), theatrical tricks of perspective in the decorative painting, and extravagantly attitudinizing sculpture, all exhibit the degenerate taste of the seventeenth century. The Jesuit order contributed to this by the encouragement it gave to sensational design and imitative shams in the many costly churches it erected during this period, so that the style as shown in churches (e.g., Sta. Maria Vittoria at Rome or Gli Scalzi at Venice) is sometimes called the Jesuit style. Both the façade and the interior of St. Peter's show the influence of these tendencies, of which the earlier phase may be recognized in the three fine palaces on the Capitol at Rome begun by Michelangelo but not completed till long after his death. Not all his successors yielded to the Baroque spirit: many works of G. della Porta and D. Fontana show classical dignity and restraint, while such late works as Longhena's palaces and his Church of the Salute at Venice, and Galilei's fine façade of S. Giovanni in Laterano at Rome, are designs of much dignity and artistic worth.

The Baroque fashion spread to Germany and Austria, where its products were for the most part heavy and tasteless, and to France, where under Louis XIV there was much more of classical restraint and cold stateliness than in Italy (e.g., St. Sulpice, Paris, and the Palace of Versailles); and where in the eighteenth century it developed the fantastic style of interior detail known as "Rococo" (q.v.), "genre Rocaille," and "Louis Quinze." The only distinctively Baroque monument in England is the fantastic porch of St. Mary's at Oxford. The extravagant Spanish Churrigueresque style (q.v.) is the Iberian version of the Baroque, and its influence is traceable in Latin America in church façades and altarpieces. See articles on architects named. Consult also the various histories of architecture; also Gurlitt, *Geschichte des Barockstiles in Italien* (Stuttgart, 1887); Ricci, *Baroque Architecture and Sculpture in Italy* (London, 1912).

**BAROCHE**, bȧ'rôsh', PIERRE JULES (1802–70). A French politician, born in Paris; became an advocate in 1823 and in 1847 was sent to the Chamber of Deputies from Rochefort. After the Revolution of 1848 he was elected to the National Assembly. He voted at first with the adherents of the Republic, but later favored the policies of Louis Napoleon. In March, 1850, he succeeded Ferdinand Barrot as Minister of the Interior. In April, 1851, he was appointed Minister of Foreign Affairs. He became Minister of Justice and Public Worship in 1863, a senator in 1864, and resigned his portfolios in 1869. Upon the downfall of the Second Empire Baroche fled to Jersey, where he died.

**BARO'DA.** A fortified city of Gujarat, India, capital of a district, and of the native state of the same name. It is 248 miles north of Bombay, with which it is connected by railway (Map: India, B 4). It stands on the Vishvomitri, which is here crossed by four stone bridges, one of singular construction—an upper range of arches resting on a lower one. Baroda, because of its importance as a railroad centre between the coast and the interior, has considerable trade in the produce of the surrounding districts, grain, flax, cotton, and tobacco. The city is intersected by two wide streets, which meet at right angles in a central market place. The chief native structures of interest are the old palace, the Naulakhi Well, and the modern Lakshmi Villas palace, which dominates the town. There are several fine European buildings, including the Anglican Church, dating from 1824, the Baroda College, the Anglo-Vernacular School, the Baroda State Library, and the Dufferin Hospital. The town has a splendid modern system of water works since 1892, supplied from a distance of 18 miles by the artificial lake covering 4.71 square miles. Baroda is the residence of the Gaikwar, a protected Mahratta prince. In 1875 Sayaji Rao III replaced Malhar Rao, the preceding ruler, who was accused of misrule and oppression and suspected of an attempt to poison the British resident. The state has been tributary to Great Britain since 1802. Pop. of town, 1891, 116,400; 1901, 103,800; 1911, 99,345. These figures include a military cantonment of 5000 troops. Area of state, 8100 square miles. Pop., 1891, 2,415,400; 1901, 1,952,692; 1911, 2,032,798.

**BAROGRAPH.** See ANEROID.

**BAROM'ETER** (Gk. *βάρος, baros*, weight + *μέτρον, metron*, measure). An instrument for measuring the elastic pressure of the atmosphere. Plato and Aristotle maintained that the atmosphere has weight; Galileo and Torricelli knew that pressing upon the water in a well forced a portion of it to rise up the bore of a pump as fast as the piston rose. The fact that water could not be made to rise more than 33 feet in this manner showed to Galileo's mind the limit-

ing pressure of the atmosphere, viz., about 15 pounds to the square inch. In 1643 his pupil and successor, Torricelli, desiring to find a convenient method of measuring the variations of atmospheric pressure, asked Viviani to use a short glass tube closed at one end, filled with mercury, and inverted in a basin of that heavy liquid, as in Fig. 1. As he predicted, so it was found that a column of mercury 30 inches high, corresponding to the atmospheric pressure (15 pounds to the square inch), was held up by the air pressure, and the upper portion of the glass tube was empty. This vacant space was called the Torricellian Vacuum. According to Hellmann, this simple apparatus was first called a barometer by Boyle.

Among the important forms of the mercurial barometer may be mentioned the siphon barometer illustrated in Fig. 3. If the diameter of the tube is perfectly uniform, the capillary effects at the upper and lower ends of the column partially neutralize each other, but not entirely so, because the mercury in the lower end is exposed to the air, and its capillary reaction differs from that of the mercury in the vacuum. Moreover, the superficial film exposed to the air changes by oxidation, and its surface tension is altered with lapse of time. The measurement of the barometric column is facilitated by having the upper and lower arms of the siphon in the same vertical line, as shown in the illustration. In some barometers the mercury of the open end is protected from the air and dust by a convenient flexible covering, such as a film of oil, or by tying a loose india-rubber bag over the open end of the tube. When the barometric tube is of large bore, for example an inch or more, the capillary depression of the column at the centre is inconsequential.



Fig. 1. — Torricelli's experiment.




Fig. 2. — Ordinary household barometer.

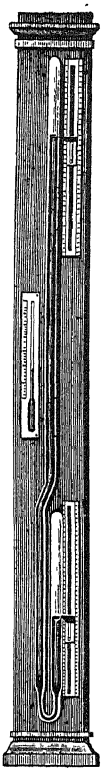


Fig. 3. — Siphon barometer.

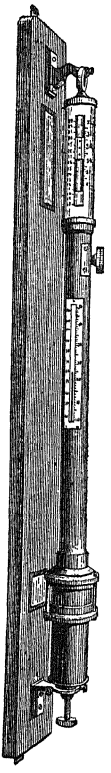


Fig. 4. — Fortin barometer.

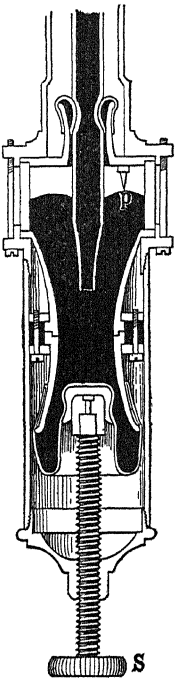



Fig. 5. — Section of cistern of standard barometer. (Green pattern.)

With the modifications and auxiliary apparatus necessary to secure the accuracy in measurement demanded by modern science, the mercurial barometer is now considered the standard instrument for measuring the elastic pressure of gases. In the normal barometers constructed for the International Bureau of Weights and Measures at Paris provision is made for measuring the temperature of the top and bottom of the mercurial column, the temperature of the metallic measuring scale, the imperfection of the vacuum, if any, the capillary effect at the surface of the mercury in the basin and in the tube, the verticality of the measuring scale, the errors of pointing and reading, the exact density of the mercury, and every other source of error that has been suggested.

The standard form of portable barometer is that illustrated in Fig. 4, as first constructed by Fortin, and now very generally copied by makers throughout the world. In this form the measuring scale extends from an ivory point (*p* in Fig. 5) upward, usually as a part of a brass cylinder inclosing and protecting the whole tube. By means of the screw *S* the mercury in the cistern may be raised or lowered until its surface just touches the point *p*. The observer

sights across the upper end of the column of mercury, and the corresponding reading on the scale is the height of the mercurial column above the point *p*. When this barometer is to be carried about, the screw *S* is turned until the mercury completely fills the cistern and is pushed up to the very top of the glass tube. The barometer is then inverted and carried or kept bottom up until wanted. In order to prevent the accidental rise of small bubbles of air within the tube of the barometer, Bunsen invented a so-called air trap, which consists simply of forming a slender internal constriction within the tube near the lower end. This slender point projects downward, and its narrow end opens within the mercury occupying the slightly enlarged portion of the main tube below the trap. Any bubbles of air slipping up the tube are almost certain to be caught in this trap and will escape back into the open air when the barometer is turned upside down for transportation. The most accurate barometers and the newest patterns are now made by Fuess, of Berlin, Green, of New York, and Casella, or Negretti & Zambra, of London. The normal barometers of Paris, Berlin, and St. Petersburg are read by means of reading microscopes so adjusted that a direct and a reflected image of a scale division or a pair of suitable cross wires appear in the field of view. By optical principles the mercury surface causing the reflection lies midway between the two images, and its position may thereby be accurately ascertained. The ordinary barometers of laboratories and meteorological stations are read by means of a vernier (q.v.) sliding up and down the scale, and by sighting across the edge of the vernier plate to the top of the mercurial column.

Liquids of small density as water, glycerine, and the like may be used to secure barometric effects upon a greatly enlarged scale. Methods of optical or mechanical magnification may also be employed, but while relative *changes* of air pressure may be obtained thereby, the *absolute* pressure cannot generally be determined accurately by such means.

Barometric pressures are properly expressed only in standard units of force or dynes, but it is more common to express them in inches or millimeters, meaning thereby the force or pressure corresponding to weight of a mercurial column of that height; but this pressure depends, not merely upon the height of the column of mercury, but also upon its density and on the force of gravity. The former varies with the temperature; the latter varies with latitude and slightly with the height above sea level. Moreover, the surface tension or so-called capillarity of the mercury in the glass tube and the cistern affect the height of the column of mercury. Corrections for these sources of error must therefore be made, and, by vote of the International Congress, meteorologists now follow the example of the physicists in reducing all barometric measurements to the standard density of pure mercury at zero degrees, Centigrade, and to standard gravity at the latitude of 45° and sea level. A standard pressure of 750.06 mm. (29.53 inches), corresponds to a force of 1,000,000 dynes. The suggestion of Bjerknes Sandström and others that this force be named one Bar and adopted as a new unit of pressure is generally accepted and is already in some use, notably by the United States Weather Bureau in its Weather Map of the Northern Hemisphere, and by the British Meteorological Office. The subdivisions of the new unit are, decibar, centibar, and millibar. The latter is $\frac{3}{4}$ of a millimeter on the ordinary scale. The barometer has many important uses and applications in science and is constantly employed in hypsometry, or the measurement of heights, meteorology, and investigations in physics. (See METEOROLOGY; HYPSOMETRY.) The mercurial barometer was made to register its own indications by Samuel Moreland as early as 1670 or 1680, and many improved forms have since been devised, registering by the help of photography, electrically, mechanically, or by gravity. The best of these appears to be the sliding-weight barograph, as perfected by Sprung in Germany, and a mechanical siphon barograph of great precision by Marvin in the United States. When the branches of a siphon tube are properly proportioned, the level of the mercury in the open arm is unaffected by changes of temperature. This automatic compensation is realized in the Marvin barograph. As a substitute for the mercurial barometer, a form called the aneroid (q.v.) was devised by Vidi, and a similar form, sometimes called the pressure gauge (see MANOMETER), was devised by Bourdon.

**Bibliography.** For many details as to the history and construction of the instrument and corrections for sources of error, consult Abbe, *Treatise on Meteorological Apparatus and Methods* (Washington, 1887). For an interesting account of the invention and development of the barometer, with illustrations showing early instruments, consult Gerland and Traumüller, *Geschichte der physikalischen Experimentirkunst* (Leipzig, 1899). The ordinary student manuals of practical physics contain descriptions of barometers and their use, while further information can be obtained from the circulars and bulletins of the United States Weather Bureau.

**BAROMETER,** WATER. A barometer in which water is used instead of a column of mercury. As water has about one-fourteenth of the specific gravity of mercury, the pressure of the atmosphere will support a column nearly 14 times as high, consequently the movement caused by variations in atmospheric pressure will be over a more extended scale. The chief disadvantage of this arrangement is due to the water vapor in the upper part of the tube exerting a pressure on the liquid below and causing a shortening of the column. The tension of the aqueous vapor depends upon the temperature, and changes in the reading may be produced independent of variations in the atmospheric pressure. Glycerine and sulphuric acid have also been used in similar barometers with much smaller errors.

**BARO'MET'RIC LIGHT.** A faint electric light produced in the vacuum of a mercurial barometer by swinging the instrument to and fro, causing friction of the mercury against the inside of the tube. The phenomenon was first noticed by Jean Picard of Paris in 1675, and an instrument to produce this light was devised by John Bernouilli for Frederick I of Prussia in 1700. Using an air pump to produce a vacuum, Francis Hauksbee constructed a jar in which a bright light was obtained by the friction of falling mercury with the glass. A description of the apparatus and his explanation of the phenomenon are given in the *Philosophical Transactions* of the Royal Society of London for

Lords in the celebrated Berkeley Peerage case in 1863. Consult Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1899). In Scotland any large freehold estate, even when held by a commoner, is known as a barony.

The term *barony* is also applied to the hereditary title or degree of nobility which in England entitles the holder to a seat in the House of Lords. See BARON.

**BAROQUE ART.** See BAROCCO.

**BAROTAC NUEVO,** bä'rō-täk' nwā'vō. A pueblo in the southeast part of the island of Panay, in the province of Iloilo, Philippines. It is on the left bank of the Jalaur River, 14 miles north-northeast of the town of Iloilo. It is in a fertile region and trades in trepang and rice. Pop., 1903, 9904. The town of Dumangas, on the right bank of the river, was annexed to Barotac Nuevo in 1903. Its population at that time was about 15,000.

**BAROTSE,** bä-rōt'sē. A former kingdom of South Africa, now a part of Rhodesia (q.v.).

**BAROZZI,** bä-rōt'sē, GIACOMO. See VIGNOLA.

**BARQUISIMETO,** bär-kē'sē-mā'tō. An episcopal city, capital of the State of Lara, Venezuela, on the Barquisimeto River, 90 miles southwest of Puerto Cabello (Map: Venezuela, D 2). The city is in a plain, 2000 feet above sea level. It is the seat of a college and other educational institutions and has several fine buildings, among which are the government palace, the barracks, the cathedral, and the market. It is the centre of a fertile agricultural and stock-raising district and, owing to its excellent transportation facilities, controls important commercial interests. The principal articles of trade are coffee, cacao, sugar, and rum. Barquisimeto, one of the oldest settlements made by the Spaniards in America, was founded in 1552. It was almost completely destroyed by the great earthquake of 1812 and suffered severely during the War of Independence and the later civil wars. From 1830 to 1881 it was the capital of the state of the same name. Pop., 1891, about 30,000 (with the district); 1894, 31,476; 1910 (est.), 32,500.

**BARR,** AMELIA EDITH (HUDDLESTON) (1831–1919). An Anglo-American novelist. She was born at Ulverston, England, March 29, 1831, and married Robert Barr in 1850. In 1854 she removed to Texas and in 1869 to New York, where she took up literature as a calling. She has written some 30 novels, among them *Romance and Reality* (1872); *Jan Vedder's Wife* (1885); *A Daughter of Fife* (1886); *A Bow of Orange Ribbon* (1886); *Friend Olivia* (1891); *Birds of a Feather* (1893); *The Lone House* (1894); *Bernicia* (1895); *A Knight of the Nets* (1896); *Trinity Bells* (1899); *The Maid of Maiden Lane* (1900); *Souls of Passage* (1901); *The Lion's Whelp* (1901); *The Black Shilling, The Belle of Bowling Green* (1908); *The Strawberry Handkerchief* (1908); *The Hands of Compulsion* (1909); *The House of Cherry Street* (1909); *Sheila Vedder* (1911). A full list of her books would comprise more than 60 titles. She is best in historical tales with a flavor of religious persecution, and in scenes of Scotland, the north of England, and Dutch New York. Consult her autobiography, *All the Days of my Life* (1913).

**BARR,** ROBERT (1850–1912). An English novelist, born at Glasgow, Scotland. He was educated at the Normal School of Toronto, Canada, was headmaster of the Central School, Windsor, Ontario, and in 1876 became a member of the staff of the *Detroit Free Press,* in which his contributions appeared under the signature "Luke Sharp." He was from time to time a resident of the United States and drew freely upon American life for his scenes and characters. In 1881 he removed to London, to establish there the weekly English edition of the *Free Press,* and in 1892 joined Jerome K. Jerome in founding the *Idler* magazine, from whose coeditorship he retired in 1895. Barr displays much shrewd observation in *A Woman Intervenes* (1896), a story of love, finance, and American journalism. He essayed the historical novel in the *Countess Tekla* (1899). *In the Midst of Alarms* (1894, 1900, 1912), a story of the attempted Fenian invasion of Canada in 1866, has enjoyed wide popularity. Other publications are: *In a Steamer Chair* (1892); *The Face and the Mask* (1894); *The Unchanging East,* travels (1900); *The Victors* (1901); *A Prince of Good Fellows* (1902); *The Tempestuous Petticoat* (1905–12); *Stranleigh's Millions* (1909); *The Sword Maker* (1910); *The Palace of Logs* (1912); *The O'Ruddy,* with Stephen Crane (posthumous, 1913).

**BAR'RA.** A small island of the outer Hebrides, Inverness-shire, Scotland (Map: Scotland, A 3). It is 8 miles long and 2 to 4 miles broad, with deep inlets of the sea. The inhabitants (about 2500) are Roman Catholics and speak Gaelic. Their main occupations are cattle raising and fishing. South of Barra is the islet of Berneray, with the highest lighthouse in Great Britain, 683 feet above high water and visible for 33 miles.

**BARRACKPUR,** bär'rak-pōōr' (Eng. *barrack* + Skt. *pur,* city). A native town and military cantonment in Bengal, British India, on the east bank of the Hugli, 15 miles north of Calcutta and on the East Bengal Railway (Map: India, E 4). It is the capital of a sub-district which was formed in 1904. Many inhabitants are employed in the mills, which are just outside the town. Pop., 18,000. From the salubrity of its air Barrackpur is a favorite retreat for Europeans from Calcutta and is the country residence of the Governor-General. Barrackpur is historically prominent among the centres of the mutinies of 1824 and 1857. See INDIA.

**BAR'RACKS** (Fr. *baraque,* It. *baracca,* Sp. *barraca,* a tent; origin uncertain). A permanent structure for the housing of troops, as distinguished from temporary cantonments or camps. In England the practice of billeting or quartering soldiers on the citizens had in 1792 become a great burden; added to which was the effect on the morals of the community, caused by the dissolute character of the soldiery of the period. Consequently George III obtained the consent of Parliament for the construction of new barracks, not without considerable opposition, however; as it was urged that the liberty of the subjects might possibly be endangered by separating the soldiers from the citizens and placing them in the hands of the ruling power. At first, barracks were built without much regard to the health of the troops, the only consideration apparently being their local usefulness. In the United States great care is taken in the selection of site and in the building of military barracks or forts. Good elevation, water, and clean environment are of the first importance; after which, in the design and construction, an abundant supply of fresh air is

made an important factor. The name is used as a part of the official designation of a number of important military posts in the United States, the best known of which are: Columbus Barracks, Jackson Barracks, Jefferson Barracks, Madison Barracks, Plattsburg Barracks, San Diego Barracks, and Washington Barracks (qq.v.).

**BARRACUDA**, bär'rȧ-kōō'dȧ, or **BARRACOOTA** (native name). 1. A large, pike-shaped, predatory, marine fish of the teleost family Sphyrenidæ (allied to the mullets), occurring in all tropical and sub-tropical seas and common on both coasts of America. It is known as the Barracoota, or giant Australian mullet, off the Australian coast. The great barracuda or picuda (*Sphyræna barracuda*) frequents our southern coasts. "It sometimes," says Dr. Theodore Gill, "attains a length of 8 feet and a weight of about 40 pounds. . . . It is a carnivorous fish, and destructive to the finny tribes generally. As a food fish it is under suspicion. . . . It seems, however, only under special conditions that the flesh is poisonous, for generally it can be eaten with impunity and is quite savory." This fish is really a source of danger to swimmers, and many mutilations or deaths credited to sharks are probably the result of a barracuda's attack. See Plate of MULLETS.

The barracuda of the southern California coast (*Sphyræna argentea*) is 3 feet long, and an important food fish, caught in summer and especially esteemed when dried and salted. The species seen in the North Atlantic, the becuna, spet or sennet (*Sphyræna spet*), is smaller.

2. The snook (q.v.) of the Cape of Good Hope.

**BARRA DO RIO NEGRO**, bär'rȧ dō rē'ō nā'grō. See MANÁOS.

**BARRAMUNDA**, bär'rȧ-mŭn'dȧ (native Australian name). An extraordinary lungfish (*Ceratodus* or *Neoceratodus fosteri*) of the rivers of Queensland, Australia, where it is sometimes called native salmon, on account of the reddish hue of its flesh, and also flathead. It is an ugly, dark-colored creature, 3 to 6 feet long, looking more like a huge salamander than a fish, though clothed with large scales. It frequents muddy ponds and streams, and when the water is too foul to yield a sufficient supply of oxygen to its gills, the fish comes to the surface or crawls out upon the muddy shore, and at this time the lungs begin to function, and respiration takes place by this means alone. It feeds on fallen leaves and decayed vegetation and it produces eggs in a gelatinous envelope like those of amphibians. Its flesh is highly prized by the aborigines. The principal interest of it lies in the fact that its two species represent a family, Ceratodontidæ, constituting an order, Monopneumona, of dipnoans. Fossil remains show that in the early ages the family was distributed nearly all over the world, but now it is restricted to Queensland. It is a survival of the Paleozoic Age. The name is given also to the *Osteoglossum leichhardtii* and many other varieties of river fish. See DIPNOI.

**BARRANDE**, bȧ'rȧNd', JOACHIM (1799–1883). An eminent French geologist and paleontologist, born at Saugues, department of Haute-Loire. He made a study of the Silurian formations in Bohemia, on which he wrote his principal work, *Système silurien du centre de la Bohême* (1852), and his investigations brought out new and valuable information concerning the trilobites. His works include: *Colonie dans le bassin silurien de la Bohême* (1860); *Représentation de colonies de la Bohême dans le bassin silurien du nordouest de la France* (1853); *Céphalopodes, études générales.*

**BARRANQUILLA**, bär'rȧn-kē'lyȧ. A seaport of Colombia, situated just above the delta of the Magdalena River (Map: Colombia, C 1). The town is not very well built, but is the terminus of river traffic, as the Magdalena is not navigable at its mouth. Barranquilla is connected with the coast by a railroad to the port of Sabanilla, 14 miles to the northwest, and is the seat of a United States consulate. River trade has brought prosperity to the town. It exports coffee and hides, principally to European countries. In 1909, during a revolt, the port was blockaded by the government. Pop., 1912, 43,907.

**BARRANQUITAS**, bär'rȧn-kē'tȧs. A village on the north coast of Porto Rico, 4 miles northwest of Aibonito (Map: Porto Rico, D 3). It has several schools and a church and is in a rich agricultural district. Pop., 1910, town, 772; municipality, 10,503.

**BARRAS**, bȧ'rȧs', PAUL FRANÇOIS JEAN NICOLAS, COUNT DE (1755–1829). A distinguished character of the French Revolution. He was born in Provence and in his youth served as a lieutenant against the British in India. He eagerly joined the Revolutionary party, but was not, as is generally but erroneously stated, a member of the States-General in 1789. He was actively concerned in the storming of the Bastile and the Tuileries, and was appointed administrator of the department of Var and afterward of the county of Nice. In the Convention he voted for the execution of the King, without delay or appeal, and on May 31, 1793, declared against the Girondists. The siege of Toulon, and the triumph of the Revolutionary party in the south of France, were in a great measure owing to his activity and energy; and after the victory he was deeply concerned in all the bloody measures that were adopted. Yet he was hated by Robespierre and the Terrorists as one of the less-decided Revolutionists; and their overthrow was accomplished mainly by him, the Convention appointing him commander in chief and virtually investing him with a dictatorship for the time. While holding this high office, in which he acted with great decision and vigor, and on the same day on which Robespierre fell (9 Thermidor, July 27, 1794), he paid a visit to the Temple and provided for the better treatment of the King's son. He hastened also to the Palais de Justice and suspended the order for the execution of a large number of persons who had been condemned to death. On subsequent occasions, as president of the Convention, he acted with decision both against the intrigues of the Royalists and the excesses of the Jacobins; and on 13th Vendémiaire (Oct. 5, 1795), being again appointed commander in chief by the Convention, he called his young friend Bonaparte to his aid and crushed the sections with merciless discharges of artillery. The Directory being appointed in November, 1795, Barras was nominated one of the five members, and in this capacity he procured the nomination of Bonaparte as commander in chief of the army in Italy. It was he who arranged the marriage of Bonaparte with the widow Beauharnais after 18th Fructidor (see FRUCTIDOR; FRANCE), Sept. 4, 1797, when the Royalist intrigues were crushed by Napoleon, the authority of Barras became prepon-

derant in the Directory, and he affected the pomp of a king, and began to give splendid entertainments in the palace of the Luxembourg. This continued for about two years, till the decline of the power of the Directory. After the 30th Prairial (June 18, 1799) Sieyès and he had the whole executive power in their hands; and while Barras secretly negotiated, it is said, with the Bourbon princes, demanding a large reward for their restoration, Sieyès, in secret understanding with Bonaparte, brought about the Revolution of 18th Brumaire (Nov. 9, 1799), which replaced the Directory by the Consulate. Notwithstanding the favors he had formerly conferred on Bonaparte, he was now, perhaps unavoidably, an object of suspicion to him; was compelled to remove from the neighborhood of Paris; resided in Brussels, then in Marseilles; was banished to Rome, and then sent to Montpellier, being kept under constant surveillance of the police and actually found to have been engaged in conspiracies for the restoration of the Bourbons. After the Restoration he returned to Paris and purchased an estate in the neighborhood, where he died. After remaining inaccessible for nearly 70 years, his memoirs were published in Paris and New York, 1895–96. They are of the first importance in throwing light on the history of the Revolution.

**BAR'RATRY** (Fr. *barateria*, LL. *barataria;* cf. Eng. *barter*, OF. *barater*, *bareter*, to deceive, cheat, barter). At the common law, the offense of frequently stirring up groundless suits and quarrels. Common barratry is rated as a public nuisance and is punishable, generally, as a misdemeanor. It is not a crime for a man to bring frequent lawsuits without success unless they are vexatious and without reasonable cause. Nor does the institution or instigation of a single groundless and malicious suit make the wrongdoer a common barrator, although his act may amount to the offense of champerty (q.v.) or maintenance (q.v.) and may render him liable to a civil action for damages. In order to convict him of barratry, proof must be given that he has excited groundless litigation in at least three instances. If the offender is an attorney, he may be disbarred as well as punished criminally. Consult Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1899).

**Barratry.** In maritime law barratry is any wrongful act willfully committed by the master or crew of a vessel with intent to defraud the owner or charterer; every palpable violation by him or them of trust to the prejudice of the ship and cargo. Negligence does not amount to barratry, unless it is so gross as to constitute fraud. Barratry may be insured against. In *bills of lading* it is excepted frequently from the shipowner's liability. In the absence of such exception the shipowner is liable for the barratry of his agents and servants to the cargo owner. A willful breach of blockade, or sailing out of port without paying port dues, whereby the ship and cargo become liable to forfeiture, is barratrous. Consult Arnould, *Treatise on the Law of Marine Insurance and Average* (7th ed., London, 1901).

**BARRATT,** JOHN OGLETHORPE WAKELIN. An English pathologist, born in Birmingham. His education was obtained from University College, London, and the universities of Göttingen and Munich. In 1873–76 he was engaged in experimental work in physiology and pathology at University College, and in 1897–99 was research worker in neuropathology at the London County Asylums laboratory. After serving as pathologist and research student at several other important institutions, he became in 1906 research worker in the department of cytology and cancer research at the University of Liverpool. Of this institution's cancer research laboratory he was appointed director in 1909. He contributed many articles on pathological subjects to German and English medical journals.

**BARRE,** bär'ē. A town in Worcester Co., Mass., 22 miles northwest of Worcester, on the Boston and Maine, and the New York Central railroads (Map: Massachusetts, C 3). It is the seat of the Elm Hill School for the feeble-minded, the Stetson Home for poor boys, and has a library and museum. The industries include a cotton, two wool, and a sash and blinds factory, and novelty works. Organized about 1775, the town was named after Colonel Barre, who defended the American Colonies in the British Parliament. The water works are owned by the municipality. Pop., 1890, 2239; 1900, 2059; 1910, 2957.

**BARRE.** A city in Washington Co., Vt., 6 miles southeast of Montpelier, on the Montpelier and Wells River, and the Vermont Central railroads (Map: Vermont, D 4). It is widely noted for its large granite interests and contains the Aldrich Public Library, Goddard Seminary, Burns Monument, and Spaulding High School. Barre was settled about 1788, was organized as a town in 1793, and was chartered as a city in 1894. Under the charter of 1895 the government is vested in a mayor, elected annually, and a city council, of which the mayor is a member. The city owns and operates its water works and sewage system. Pop., 1900, 8448; 1910, 10,734; 1920, 10,008.

**BARRE,** bär, ANTOINE JOSEPH LE FÈVRE DE LA. See LA BARRE.

**BARRÉ,** bär'ē, ISAAC (1726–1802). A British officer and politician, born at Dublin. He was a lieutenant colonel in Wolfe's army and was wounded at the capture of Quebec in 1759. He was chosen to Parliament in 1761 and attracted attention by a violent personal attack upon Pitt, who led the opposition to Bute's administration. He opposed the Stamp Act in 1765, supported the appeal of the Colonies, and strenuously defended the American cause, for years making himself conspicuous in the various debates by his remarkable powers of invective. The "Sons of Liberty" derived their name from a chance allusion to the Americans in one of his speeches. He held various offices of importance and was in Parliament until 1790, when he retired in consequence of blindness resulting from his wound received at Quebec. He was among those to whom the Junius Letters were attributed.

**BAR'REL** (It. *barile;* Fr. *baril* = *barrique*, Gael, *baraill*, Ir. *bairile*, Slav. *barilo*). Primarily a large cylindrical vessel for holding liquids, and then, by extension, a certain *measure*, but varying in every locality and almost for every liquid. In the old English measures the barrel contained 31½ gallons of wine, 32 of ale, and 36 of beer, the wine gallon itself differing from that of ale and beer. In imperial gallons their contents would be: old wine barrel = 26¼ gal.; ale barrel, 31½; beer, 36½. The Italian *barile* varies from 7 to 31 English gallons; the French *barrique* of Bordeaux = 228 French litres = 50 English gallons. Four barriques

make a tonneau. In many cases, barrel signifies a certain *weight* or other quantity of goods usually sold in casks called barrels.

In the United States the usual barrel for liquids contains 31½ United States wine gallons of 231 cubic inches. A standard barrel of fermented liquors for tax purposes (Revised Statutes 3339) contains not more than 31 gallons and is the basis upon which the internal revenue tax is collected, while the return of the number of gallons of proof spirit distilled is made on a basis of 40 gallons to the barrel (Revised Statutes, 3309). The United States government has also prescribed a standard barrel for apples by Act of Congress approved Aug. 3, 1912, of which the dimensions, measured without distension of its parts, are as follows: Length of stave, 28½ inches; diameter of head, 17⅛ inches; distance between heads, 26 inches; circumference of bulge, 64 inches, outside measurement, representing as nearly as possible 7056 cubic inches. Steel barrels containing the interior dimensions provided for above are to be construed as a compliance therewith. The statutes of the various States provide for the dimensions of barrels and casks used for various commodities; for example, in the Consolidated Laws of the State of New York it is provided: that casks for flour and meal shall be of two sizes only. One size shall contain 196 pounds of flour or meal, with staves 27 inches long and each head 16½ inches in diameter; and the other size shall contain 98 pounds, with staves 22 inches long and each head 14 inches in diameter, or with staves 27 inches long and each head not more than 12 inches in diameter. Another typical statute is that of the State of Wisconsin, which provides that a barrel shall contain 31½ gallons and a hogshead two barrels, . . . a barrel of flour measured by hundredweight shall contain 196 pounds; a barrel of potatoes, 172 pounds; a barrel of unslacked lime, 200 pounds; a barrel of apples or pears shall represent a quantity equal to 100 pounds of grain or dry measure, etc. Numerous attempts have been made to secure a greater uniformity in barrels, especially those employed for agricultural products, and much progress recently has been made in that direction. See COOPERAGE.

**BARREL,** GUN. See ORDNANCE, SMALL ARMS.

**BARREL BULK.** A measure equal to 5 cubic feet, or one-eighth of a ton. It is used in estimating capacity for freights, 40 cubic feet being taken as one ton in estimating freight charges, where the latter are not based upon the weight.

**BAR'REL-MAK'ING MACHIN'ERY.** See COOPERAGE.

**BARREL ORGAN.** A musical instrument generally portable, in which the music is produced by a revolving barrel or cylinder, set with pins and staples, which open valves for admitting wind to pipes from a bellows worked by the same revolving cylinder. The pieces are played with an harmonic accompaniment. Barrel organs are mostly used by itinerant musicians, and their repertoire is limited. The *orchestrion* is a very large barrel organ, established chiefly in restaurants, dancing halls, and carrousels.

**BARREL VAULT.** An architectural term for a continuous semi-cylindrical vault whose section may be semi-circular, semi-elliptical, segmental, or pointed. In engineering works it is commonly called a tunnel vault. See VAULT.

**BAR'REN IS'LAND.** A volcanic islet in the Bay of Bengal, 60 miles east of Andaman Islands (Map: Burma, B 4). It is conical in shape, about 2 miles in diameter, and its cone rises to a height of 1158 feet. The volcano is in a semi-dormant state, emitting at intervals water and sulphurous gases.

**BARREN MEAS'URES.** See CARBONIFEROUS SYSTEM; COAL.

**BAR'RENNESS.** See STERILITY.

**BARRÈS,** bȧ'rĕs', MAURICE (1862–1923). A French novelist, born at Charmes-sur-Moselle. His early works, *Sous l'œil des barbares* (1888); *Un homme libre* (1889), and *Le jardin de Bérénice* (1891), are obscure, uneven, and decadent. His intentional lack of unity, his fondness for interspersed and sporadic criticism, must be held to have influenced George Moore in his remarkable, yet tantalizing, *Confessions of a Young Man.* In his later efforts Barrès works himself out of aristocratic dilettantism and writes the "romance of national energy," urging young men to remain in the provinces and build up national traditions. This is expressed in his cycle of three stories, *Les déracinés* (1897), *L'Appel au soldat* (1900), and *Leurs figures* (1902). Still carrying on the gospel of national energy comes a new series, "Ramparts of the East," of which the first volume, *Au service de l'Allemagne* (1905), deals with Alsace. Later of his writings include *Le voyage de Sparte* (1906); *Colette Bandoche* (1900); *La maîtresse servante* (1911); *En Italie* (1912). In 1906 he was elected to the Academy and reëlected, as a Nationalist, to the Chamber of Deputies, which he entered in 1889. Consult, for criticism, Kahn, *Symbolistes et décadents* (Paris, 1902) and J. G. Huneker, *Egoists, a Book of Supermen* (New York, 1909); and for biography Barrès himself, *Vingt-cinq années de vie littéraire* (Paris, 1908).

**BAR'RETT,** BENJAMIN FISK (1808–92). An American Swedenborgian minister. He was born in Maine and graduated at Bowdoin in 1832 and at Harvard Divinity School in 1838. He was pastor of the First New Church (Swedenborgian) in New York from 1840 to 1848, at Cincinnati from 1848 to 1850, and at Philadelphia from 1864 to 1871. He edited the *New Church Monthly.* His works include a *Life of Swedenborg* (1841); *Lectures on the New Dispensation* (1878); *Letters on the Divine Trinity* (1873); *The Golden Reed* (1855); *A New View of Hell* (1872; 1886).

**BARRETT,** CHARLES SIMON (1866– ). An American agriculturist, and president of the Farmers' Union. He was born in Pike Co., Ga., received a normal-school education, and engaged in teaching and farming until 1897, when he became an organizer among the farmers. In 1905 and 1906 he was president of the Georgia Farmers' Union, in the latter year becoming head of the national organization, which comprises 2,500,000 members in 31 States. He was a member of Roosevelt's Country Life Commission and a delegate to the National County Life Congress of 1911. He published *Mission, History, and Times of the Farmers' Union* (1909).

**BARRETT,** JOHN (1866– ). An American journalist and diplomat, born at Grafton, Vt., in 1866. He graduated from Dartmouth College and, after teaching for some time, was associated with several important newspapers on the Pacific coast. He was appointed Minister to Siam in 1894, resigning in 1898 to act as war correspondent in the Philippine Islands. He was

Minister to Argentina (1903–04), to Panama (1904–05), and became Minister to Colombia in 1905. Mr. Barrett has done much to promote American commercial interests both in Asia and in South America. In 1906 he became director-general of the International Bureau of Pan-American Republics, later the Pan-American Union. He published *Admiral George Dewey* (1899); *Pan-American Union: Peace, Friendship, Commerce* (1911); *The Panama Canal and What it Means* (1913).

**BARRETT,** LAWRENCE (1838–91). An American actor, born at Paterson, N. J. For a time he worked in a dry-goods shop at Detroit, Mich., and in that city, in 1853, as Murad in *The French Spy*, made his first stage appearance. In 1857–58, at New York and Boston, he supported Edwin Booth, E. L. Davenport, and other prominent players. In 1861 he served in the Federal army as captain in the Twenty-eighth Massachusetts Volunteer Infantry. Subsequently he became the leading member of Edwin Booth's company during a remarkable series of performances at the Winter Garden, New York City. For several years he managed, with heavy pecuniary loss, the Varieties Theatre, New Orleans, La., but in 1869–70 won brilliant artistic and financial success as copartner with John McCullough of the California Theatre, San Francisco. At Booth's Theatre, New York City, he appeared in 1875 as Cassius and the King, in magnificent revivals of *Julius Cæsar* and *King Lear*. In 1884 he was favorably received during a brief visit to England. From 1887 until his death he was associated with Edwin Booth in one of the most significant enterprises in the history of the American drama. His greatest part was that of Cassius; but he was likewise highly effective as Hamlet, King Lear, Shylock, Richelieu, Lanciotto, and the Man o' Airlie. In general, it may be said that his work was marked by fine conscientiousness and high intellectual force, although not credited by the critics with the touch of distinctive genius displayed by his coworker, Booth. He was an energetic manager, did much to encourage dramatic authorship, and wrote a discriminating and very readable *Life of Edwin Forrest* (1881), and an admirable sketch of Edwin Booth in *Edwin Booth and his Contemporaries* (Boston, 1886).

**BARRETT,** WILLIAM FLETCHER (1844–1925). An English physicist, born in Jamaica, West Indies. From 1862 to 1866 he was assistant to Professor Tyndall at the Royal Institution, London; in 1867 was appointed instructor in science at the International College; in 1869 lecturer in physics at the Royal School of Naval Architecture, and from 1873 to 1910 he was professor of experimental physics at the Royal College of Science, Dublin. He helped found, in 1882, the Society for Psychical Research, whose purpose was defined as "an organized attempt to investigate that large group of debatable phenomena designated by such terms as mesmeric, psychical, and spiritualistic." In 1885 he established in the United States a branch of the society. He is known for original investigations in magnetism and radiant heat, which include discussions of the contraction of nickel by magnetization, sensitive flames, and the recalescence of iron. His publications, in addition to numerous contributions to the *Philosophical Magazine* and other periodicals, include *Lessons in Science* (1880); *A Monograph on the So-called Divining Rod* (1897–1900); *Early Chapters in Science* (1899); *Introductory Practical Physics* (with W. Brown, new ed., 1906); *A New Form of Polarimeter* (1909); *Open-Scale Isothermal Air Barometer* (1910); *Creative Thought* (1911); *Swedenborg, the Savant and the Seer* (1913).

**BARRETT,** WILSON (1846–1904). An English actor, manager, and playwright. He was born in Essex, Feb. 18, 1846, and went upon the stage at Halifax in 1864. After playing in different provincial towns he became manager of the Amphitheatre, at Leeds, and of other playhouses. In 1879, three years after his first appearance in London, he took the management of the Court Theatre, the next year securing Madame Modjeska for her first English appearance. He became manager of the Princess's Theatre in 1881 and produced *The Lights o' London*, which ran for 286 nights. In 1882 came *The Silver King*, with Barrett's rôle of Wilfred Denver, which had an even longer run. His *Hamlet* was first presented in London in October, 1884. This was his best Shakespearean part, the other most notable being *Othello* (1897). In 1886 he produced *Clito*, a tragedy written by himself and Sydney Grundy. His own drama of *Nowadays* he brought out in 1889, and his *Pharaoh*, at Leeds, in 1892. The most successful of his own plays was *The Sign of the Cross*, founded on legends of the early Christian martyrdoms under Nero. Produced in America in 1895, it met with great popular favor, and though severely dealt with by some of the critics, had a run of more than a year at the Lyric Theatre, London, which Barrett took in 1896. There, in February, 1897, he produced his *Daughters of Babylon*. He also produced his own adaptations of several novels, among them Hall Caine's *Deemster* (as *Ben my Chree*, 1888), *The Bondman* (1893), *The Manxman* (1894), and Sienkiewicz's *Quo Vadis?* (at Edinburgh, May, 1900). He was author or joint author of several works of fiction, among them novels based on *The Sign of the Cross* and *Daughters of Babylon*.

He came to America for more or less extended tours in 1886, 1888, 1889, 1893, and 1897. In 1898 he visited Australia. In 1899 he became manager of the Lyceum. Consult Scott, *The Drama of Yesterday and To-day* (London, 1899).

**BARR/HEAD.** A police burgh in Renfrewshire, Scotland, 3½ miles southeast of Paisley. Cotton mills, bleaching, weaving, dyeing, engineering, and other works combine with its railway facilities to make it a busy and thriving town. It was founded in 1773. Pop., in 1911, about 10,000.

**BAR/RI,** GIRALDUS DE. See GIRALDUS DE BARRI.

**BARRIAS,** bȧ'rē'-ȧs, ERNEST (1841–1905). A French sculptor, born in Paris. He was a pupil of Cavelier and Jouffroy. In 1861 he won the *Prix de Rome*. He gained his first noteworthy success in 1870 with a "Young Girl of Megara" (Luxembourg). His best-known work is "The First Burial" (1883, Hôtel de Ville; a bronze replica in Metropolitan Museum, New York City); and his later productions include the "Young Mozart" (1887, Luxembourg); "The Girl Spinning": the celebrated monument of Victor Hugo (1902, Paris); and "Joan of Arc as a Prisoner" (1903). His style is marked by an attempt at compromise between academic classicism and modern naturalism.

**BARRIAS,** FÉLIX JOSEPH (1822–1907). A French historical and portrait painter, brother of the preceding. He was born in Paris. He

studied with Léon Cogniet and in 1844 took the *Grand Prix de Rome* with "Cincinnatus Receiving the Deputies of the Senate." For half a century he was known as one of the most earnest champions of academic tendencies, especially in historical painting. For 60 years he was an almost annual exhibitor in the Salon. Among his chief works of this class are "Pilgrims going to Rome for the Jubilee of 1300" (1855), "Socrates Bidding Farewell to his Friends" (1873); "The Death of Chopin" (1885). Between 1860 and 1875 he was especially active in mural decorations, of which specimens are to be seen in the Hôtel du Louvre, the churches of St. Eustache and the Trinité, and the foyer of the Opéra, Paris; and at Grosvenor House, London.

**BAR'RICADE'** (Fr., Sp. *barricada*, literally, made of barrels, from *barrica*, barrel). An improvised defensive work, employed to bar narrow passages, streets, roads, etc. When built by regular troops, use is made of beams, chains, *chevaux-de-frise*, and other specially adapted materials; if erected by civilians or mobs, any available material that may be at hand is used. Barricades have been used since the earliest times, but are perhaps better known in connection with the insurrections in the city of Paris. (See below.) After his ascension to the throne Napoleon III widened the principal streets of Paris and laid them with asphalt, so as to render the successful erection of barricades next to impossible.

**BARRICADES,** The Days of the. A phrase applied to popular uprisings in Paris. The first was May 12, 1588, when the people rose against the Duc de Guise and barricaded the streets; another, Aug. 5, 1648, when the people rose at the commencement of the Fronde; others, again, in July, 1830, and in February, 1848.

**BAR'RIE.** The capital of Simcoe Co., Ontario, Canada, 63 miles northwest of Toronto on the Grand Trunk, the Canadian Pacific, and the Hamilton and Northwestern railways, and on Lake Simcoe (Map: Ontario, D 3). It is a favorite summer resort and is the centre of a grain-raising district. The manufactures include carriages, leather, and wicker work, and there are foundries, breweries, woolen, flour, and planing mills, etc. There is a business college at Barrie. Pop., 1901, including Allandale, 5949; 1911, 6420.

**BARRIE,** Sir James Matthew, Bart. (1860–). One of the most popular of contemporary novelists and dramatists, born at Kirriemuir, Scotland. The sketches and stories which he contributed to papers and periodicals soon after his graduation from Edinburgh University in 1882 brought him to the attention of the British public and made him within a few years first without a second among the recent writers who have found their material in the village and country life of Scotland. In 1885 he moved to London. With the publication of *Auld Licht Idylls* (1888) and *A Window in Thrums* (1889) the author's success was assured. *The Little White Bird* (1892) and *Sentimental Tommy* charmed his old readers and won him a host of new ones. These four books represent and measure the distinctive genius or talent of their author. The painting of homely Scotch life, the tricksy wit, the fresh vernacular style, the pervasive sentiment, the overflowing pathos —these were the making of the *Idylls* and *A Window in Thrums*, while his tenderness for child life, his poetic fantasy, and his whimsical invention created *Sentimental Tommy*, *The Little White Bird*, and their like. Many successes followed the "Thrums" idylls; among them, in addition to the books already named, *My Lady Nicotine* (1891), *The Little Minister* (1891), and *Tommy and Grizel* (1900). By 1900 the struggling journalist of the early nineties had become one of the most popular writers of his time. And other laurels in a new field had been won. In 1892 his farce, *Walker, London*, scored a success, and one of the actresses who had a part in that play became his wife in the following year—a marriage that ended in a divorce in 1909. Other plays, some of them based on his work in fiction, were still more successful: *The Professor's Love Story* (1895); the stage version of *The Little Minister* (1897); *Quality Street*, *The Admirable Crichton*, and *Little Mary*, all produced in the year 1903. *Peter Pan*, a fantasy elaborated from an episode of *The Little White Bird* and worthy of Hans Andersen, belongs to 1904, and *Alice-Sit-by-the-Fire* and *What Every Woman Knows* respectively to 1905 and 1908. He was made a baronet in 1913. As a dramatist Mr. Barrie is not in the main current of present-day dramatic activity, which runs to the problem play; his sphere is the comedy of manners and the fantasy, and within this sphere his freshness of invention, his stage craft, the spontaneity of his humor, his genial if not incisive satire, and an engaging personality have secured him a distinguished place. A sound criticism of Barrie is contained in Stevenson's comment in a letter (Dec. 22, 1892) to Henry James, "There was genius in him, but there was a journalist on his elbow." If not weighty, deep, or searchingly sincere in either novel or drama, his work has a kindly humanity, a whimsical humor, a grace of sentiment, and a bizarre fancy that have cast an unfailing spell over a vast and varied audience. The following, with the books already named, comprise the bulk of his work: *Better Dead* (1887); *When a Man's Single* (1888); *An Edinburgh Eleven* (1888); *Margaret Ogilvie* (1894); *The Wedding Guest* (a play, 1900); *Peter Pan in Kensington Gardens* (1906); *George Meredith* (1909); *Half an Hour*, *The Will*, *The Adored One* (or *Leonora*)—the first and third of these produced in London, the first two in New York, 1913, and *Leonora*, 1914, with Maude Adams. A 10-volume edition of Barrie's *Works* was published in London, 1913. For biographical and critical material, consult J. A. Hammerton, *Barrie and his Books* (New York, 1900), which contains a list of articles on Barrie and his work. Consult also *English Illustrated Magazine*, vol. xxix (N.S.), p. 208, for bibliography of Barrie's work to May, 1903.

**BARRIÈRE,** bȧ'ryâr', Jean François (1786–1868). A French publicist, born in Paris and educated at the Academy of St. Barbe. He held various journalistic positions and in 1833 became associated with the *Journal des Débats*, to which, until his extreme old age, he was one of the most active contributors. He devoted himself principally to historic sketches and studies of the eighteenth century and the Revolutionary period. Among his principal works are the following: *Mémoires de Mme. Campan* (2 vols., 1823); *Bibliothèque des mémoires relatifs à l'histoire de France pendant le XVIII^e siècle* (12 vols., 1846–49).

**BARRIÈRE,** Théodore (1823–77). A French

dramatic author, born in Paris. His first notable success was a dramatization of Murger's *La vie de Bohême* (1851). This was followed by two other of his best plays—*Les filles de marbre* (1853) and *Les faux bonshommes* (1856). *Le Gascon* (1873) was a great success. He also published *Les Scandales d'Hier* (1875); *Les Demoiselles de Montfermeil* (1877), and also many plays in collaboration with E. Capendu, Ed. Plouvier, V. Sardou, and others.

**BAR'RIER FORTS,** THE. A series of batteries built by the Chinese on the Chu-kiang River, several miles south of Canton, and so named because at this point, during the "Opium War" with England in 1840–42, a barrier of heavy piles and sunken vessels was constructed to keep out foreign shipping. On Nov. 15, 1856, the Chinese fired without provocation on several American officers, including Captain (later Rear-Admiral) A. H. Foote, who were approaching the forts in an open boat; and in retaliation, Commodore Armstrong, then commanding the American fleet in Chinese waters, captured the forts by storm, on the 21st, the Americans losing 29 in killed and wounded, the Chinese fully 300. The forts were later demolished by the Chinese. See BOGUE FORTS; BOCA TIGRIS.

**BARRIER REEF,** THE GREAT. A chain of coral reefs off the eastern coast of Queensland, Australia (Map: Queensland, E 4). It extends from Sandy Cape to Torres Strait, a distance of about 1000 miles in a general northwest direction. It follows rather closely the windings of the coast as far as Cape Direction (12° 51′ S.). Here it diverges in a northerly direction to Anchor Cay (9° 22′ S., 144° 6′ E.), which is its northwestern extremity. Yule and Olinda entrances are possible for navigation, but are not very safe. The Pandora passage is more advantageous. The greatest distance of its outer edge from the coast is 140 miles from Port Clinton, and its nearest approach is 12 miles north of Cape Melville. The sea between the coast and the reefs is calm, and the channel is used by steamers, but is dangerous for sailing vessels. The reefs protrude above the surface at low tide, and even at high tide, when invisible, their location is indicated by the turbulent state of the water. The area covered by the reefs is estimated at 100,000 square miles. Pearls, pearl-shells, and trepang are obtained from the reefs and surrounding waters. The name is given also to a similar formation extending along the coast of New Guinea from Cape Suckling to South East Cape and along the southern and eastern shores of the Louisiade Archipelago. Consult *Australia Directory*, vol. ii (6th ed.), comprising the East Coast from Port Jackson to Cape York, etc. (London, 1907).

**BARRIERS,** BATTLE OF THE. A battle fought between the French and the Allied troops under the walls of Paris (1814), in which the latter were victorious. After this battle Napoleon abdicated.

**BARRIER TREA'TY.** A treaty framed in 1715 after the Peace of Utrecht, confirming treaties concluded between England and the Netherlands in 1709 and 1713. Consult Dumont, *Corps diplomatique* (Amsterdam, 1726–31).

**BARRILI,** bär-rē'lē, ANTONIO GIULIO (1836–1909). A popular and highly prolific Italian novelist, author of some 70 romances (published by Treves, Milan), of which *Come un sogno* is representative.

**BARRINGER,** băr'rĭn-jĕr, RUFUS (1801–95). An American lawyer, born in Cabarrus Co., N. C. He graduated at the university of his native State, studied for the bar, and afterward settled at Concord to begin the practice of the law. He was elected to the Legislature in 1848 and became a State Senator in 1850. Although strongly in favor of the continuance of the Union, he nevertheless, when the Civil War broke out, cast in his lot with his native State, joined a cavalry regiment, and gradually rose to the rank of brigadier general. After the war, he returned to the practice of law at Charlotte, where he remained until 1884, when he retired and thereafter until his death devoted himself to the management of his farm.

**BAR'RING-OUT'.** A prank once common among schoolboys in Great Britain. On the eve of a holiday the boys would attempt to bar the master out, it being understood that if they succeeded in preventing his entrance for three days they might dictate terms regarding holidays and recreation for the ensuing year, but if they failed they were at the master's mercy. Even the gentle Addison is reported by Johnson to have been a leader in an escapade of this kind at Lichfield. Though not unknown in the United States, barring-out has been here practiced for pure mischief, with no ulterior purpose.

**BAR'RINGTON,** DAINES (1727–1800). An English lawyer and antiquary. He was called to the bar at the Inner Temple, from 1751 to 1753 was marshal of the High Court of Admiralty, and in 1764 became recorder of Bristol. From 1778 to 1785 he was second justice of Chester. He also held appointment as King's counsel and as commissary-general of the stores at Gibraltar. His antiquarian papers, read before the Society of Antiquaries and the Royal Society, deal with a multitude of varied subjects, from the antiquity of playing cards to Julius Cæsar's landing in Britain. His learning was more extensive than accurate, and his curious blunders, due often to his gullibility, exposed him to no little ridicule. His edition (1773) of Alfred the Great's Anglo-Saxon version of *Orosius*, with a translation, has been discredited. The best known and most valuable of his writings is the *Observations on the Statutes* (1766), a discursive work, with no evidence of arrangement, but still valuable for its ingenious and learned notes. He corresponded with Gilbert White, of Selbourne, whose *Natural History*, it has been asserted, was prepared at his suggestion. After he had become a bencher of the Inner Temple, he was much in the Temple Gardens, where he was familiar with Charles Lamb, who calls him "another oddity," and says that "he walked burly and square." Consult Nichols, *Literary Anecdotes of the Eighteenth Century* (9 vols., London, 1812–15).

**BARRINGTON** (properly, **WALDRON**), GEORGE (1755–c.1840). An Irish author, born at Maynooth, county Kildare. He attended schools there and at Dublin and in 1771 joined a band of strolling players. Subsequently he set up in London as a polite pickpocket, his most noted professional exploit being the theft from Prince Orloff of a snuffbox roughly valued at £30,000. He was sentenced in 1790 to seven years' transportation, but during the voyage to Botany Bay he frustrated an attempted mutiny and in 1792 received the first emancipation warrant ever granted. He was long superintendent of convicts, and afterward high constable at

Parramatta. For the opening of the theatre at Sydney with the presentation by the convicts of Dr. Young's *Revenge*, he wrote the prologue containing the well-known lines—

> "True patriots we, for be it understood,
> We left our country for our country's good."

He published *A Voyage to Botany Bay* (1801), *The History of New South Wales* (1802), and *The History of New Holland* (1808).

**BARRINGTON,** JOHN SHUTE, first VISCOUNT (1678–1734). An English lawyer and polemical writer. He was born in London and was educated at the University of Utrecht, where he remained for four years. After his return to England in 1698 he published two treatises, *An Essay upon the Interests of England in Respect to Protestants Dissenting from the Established Church* (1701) and *The Rights of Protestant Dissenters* (1704–05). He was one of the commissioners sent to Scotland to win the support of the Presbyterians for the union between the two kingdoms, and in 1708 he was appointed a commissioner of customs. He was a member of the House of Commons from 1715 to 1723. Swift described Barrington as "the shrewdest head in England." He was the author of numerous religious essays, collected and published by the Rev. George Townsend, under the title of *The Theological Works of the First Viscount Barrington* (3 vols., 1828).

**BARRIOS,** bär'rē-ōs, RUFINO (1835–85). A Guatemalan politician, born at San Lorenzo. In 1871 he was prominent in the overthrow of President Cerna, and under President Granados became commander in chief of the army of Guatemala. He was president of Guatemala from 1873 until his death. Despite many dictatorial measures he did much to promote civil order and prosperity. He attempted to unite the five Central American States in a confederation; but Salvador, Nicaragua, and Costa Rica leagued against him, and during an invasion of Salvador he was killed at Chalchuapa.

**BAR'RISTER** (earlier *barester*, *barraster*, from *barre*, bar). The distinctive name by which the advocates at the English and Irish bars are known. (See BAR.) They are admitted to their office under the rules and regulations of the Inns of Court, and they are entitled to exclusive audience in all the superior courts of law and equity, and generally in all courts, civil and criminal, presided over by a superior judge. In the county courts attorneys are allowed to practice without the assistance of counsel; also at petty sessions, though at the quarter sessions where four counsel attend, the justices always give them exclusive audience. In Scotland the same body are styled advocates, and they have the same exclusive privileges that barristers enjoy in England and Ireland. Of barristers there are various ranks and degrees, and among each other they take precedence accordingly, the general name, "counsel," being, in the practice of the court, common to them all. But they may be divided into two leading groups—barristers and King's counsel. The ancient order of serjeants-at-law, formerly a well-marked third group, was distinguished by the *coif* and other peculiarities, but has now ceased to exist. (See SERJEANT-AT-LAW.) Besides these three orders of gradations of rank at the English bar, the crown sometimes grants letters patent of precedence to such barristers as his Majesty may think proper to honor with that mark of distinction, whereby they are entitled to such rank and pre-audience as are assigned to them in their respective patents. Persons who desire to become barristers must secure admission to one of the Inns of Court and, after keeping a prescribed number of "terms," must pass a "call examination" successfully and thus entitle themselves to be called to the bar. The fees which the candidate must pay on being called, before signing the roll of barristers in the King's Bench Division of the High Court of Justice, are quite onerous, ranging from £90 to £100. He remains subject to the discipline of his Inn, which has the power to "disbar" him upon criminal conviction or for gross professional misconduct.

The professional ethics, or etiquette, of the bar is carefully and accurately defined. Its principal rules are as follows: "(1) That fees are divided between a leader (who ought to be a King's counsel, a sergeant, or a barrister with a patent of precedence) and a junior in the proportion of three-fifths to the former and two-fifths to the latter; (2) that no barrister accepts business upon a circuit to which he does not belong, except for a special fee; (3) that all litigious business must come through a solicitor, though a barrister may advise a client, directly and personally, as to non-litigious matters (such as making his will, or a settlement of his property); (4) a barrister's fee is an *honorarium*, not recoverable by legal process." As a barrister cannot enforce payment for his services, the law exempts him from liability for negligence in the performance of his professional services.

There is no distinct order of counsel corresponding to barristers in the United States, the functions of counsel, or advocate, and of attorney, or solicitor, being performed by the same person.

**BARROIS,** bä'rwä', CHARLES (1851– ). A French geologist and paleontologist. He was born at Lille and was educated at the university there, where he afterward held the chair of natural sciences. He had charge of the official geological corps in Brittany, and contributed important papers descriptive of the geological structure and the fossils of that region. He was an active member of the Société Géologique du Nord and of the Société Géologique de France and served as general secretary, and as secretary of committees of the International Geological Congress. Among his literary contributions to the sciences are: *Traité de Paléontologie*, 5 vols. (Paris, 1883–93), which is a translation of Zittel's *Handbuch der Paläontologie*. The following monographs embody the results of part of his researches on the geological formations of France and the neighboring countries: *Le terrain crétacé supérieur de l'Angleterre et de l'Irlande* (1876); "Les terrains anciens des Asturies et de Galice," in *Mémoires Soc. Géol. du Nord*, vol. ii (1882); "Faune du calcaire d'Erbray (Loire-Inférieure), contribution à l'étude du terrain dévonien de l'ouest de la France," in *Mémoires de la Société Géologique du Nord*, vol. ii (1889): "Mémoire sur le terrain crétacé du bassin d'Oviédo (Espagne)," in *Annales des Sciences Géologiques*, vol. x (1879); "Mémoire sur la distribution des graptolites en France," in *Annales de la Société Géologique du Nord* (1892); "A Geological Sketch of the Boulonnais," in *Proc. of the Geologists' Association*, vol. vi (1880); "Sondages aux environs de

Lille," in *Annales de la Société Géologique du Nord*, vol. xxvi (1897). He became a member of the Institute in 1904.

**BAR'RON, JAMES** (1769–1851). An American naval officer. He was born in Virginia, went to sea at an early age, commanded several merchantmen, and in 1798 entered the United States navy as first lieutenant. In 1806 he was promoted to be commodore and in the following year commanded the *Chesapeake*, when that vessel was attacked and forced to surrender three of her crew, alleged to be British deserters, by the British frigate *Leopard*. (See CHESAPEAKE, THE.) Barron, though only in part to blame for the tame submission of his vessel, was bitterly attacked throughout the country, was tried by court-martial, and found guilty of "neglecting, on the probability of an engagement, to clear ship for action," and was suspended from active service for five years. Though he was subsequently assigned to shore duty, he never afterward was in active service and never regained his old professional status. Believing himself to be the victim of persecution at the hands of a cabal of officers, headed by Decatur, he challenged the latter and on March 22, 1820, mortally wounded him in a famous duel at Bladensburg, Md. Barron, though also seriously wounded, finally recovered and in 1839 became the senior officer in the United States navy.

**BARRON, SAMUEL** (1763–1810). An American naval officer. He was born at Hampton, Va., and was the brother of James Barron. He commanded a fleet of 10 vessels in the operations against Tripoli in 1805, but in consequence of ill health resigned his command in favor of Commodore John Rodgers. Just before his death Barron was made commander of the Gosport Navy Yard.

**BARROS.** A town in Porto Rico, 11 miles northwest of Aibonito, and 31 miles northeast of Ponce (Map: Porto Rico, D 3). It is situated in the midst of beautiful mountain scenery. The inhabitants are engaged chiefly in raising fine cattle and in the growing of coffee. Pop., 1899, 14,845; 1910, 15,028.

**BARROS** (bär'rōs) **ARANA, DIEGO** (1830–). A Chilean historian, born at Santiago. He was forced by ill health, in 1849, to abandon the practice of the law, for which he had been prepared, gave himself up to historical studies, and became known as an authority on the history of his country. He was a constant traveler and collected information from all possible sources on his favorite subject. In 1863 he was made rector of the Instituto Nacional. Among his publications are: *Estudios históricos sobre Vicente Benavides y la compañas del sur 1818–21* (1850); *Historia de la independencia de Chile* (1854–58); *Historia de la literatura* (1870); *Histoire de la guerre du Pacifique* (1881, written by order of the government); and *Historia general de Chile* (12 vols., 1884–93).

**BARROS, JOÃO DE** (1496–1570). One of the most important of the early Portuguese historians. He was born at Vizeu and became page to the Crown Prince (afterward John III), for whose amusement he wrote his three-volume romance, *Cronica do Emperador Clarimundo* (Coimbra, 1520). After the accession of King John III Barros was appointed successively captain of the fortress São Jorge de Mina, governor of the Portuguese possessions in Guinea, and in 1533 treasurer and general agent for Portuguese India. In 1539 he received from the King a grant of a province in Brazil, but an attempt to colonize it proved so ruinous that he was glad to return the grant. Barros's chief work was his *Decadas* (1552–53, 1560, 1602), a history of Portuguese India, written in fulfillment of a royal commission, left unfinished at his death and completed in 1602 by Diogo do Couto, who added eight more volumes. In this work De Barros had both an artistic and a scientific point of view. He has a keen sense of the picturesque and of the psychological, makes a critical use of his sources, judges with penetration men and events, holding in view the correlation of facts and striving for synthetic effects. A complete edition appeared at Lisbon in 24 vols. (1778–88). Consult Manoel Severin de Faria, *Vida de João de Barros* (Lisbon, 1624), A. Loiseau, *Histoire de la litérature portugaise*, chap. ix (Paris, 1887), and Ross's trans. of Bouterwek, *History of Spanish and Portuguese Literature* (London, 1823).

**BARRO'SA, or BOROSA.** A village of Spain, 16 miles south-southeast of Cadiz, celebrated as the place where General Graham, in March, 1811, with a handful of English troops, succeeded in gaining over the French, after his Spanish allies had retreated, one of the earliest victories of the Peninsular campaign. In its results the battle was indecisive, and the only thing the English gained was the glory of victory.

**BARROT,** bȧ'rō', **CAMILLE HYACINTHE ODILON** (1791–1873). A French statesman. He was born at Villefort, Lozère, July 19, 1791. In 1814 he became an advocate in the Court of Cassation at Paris, soon acquiring a high reputation as an eloquent pleader, becoming one of the most influential leaders of the Liberal opposition. He was president at this time of the Society Aide-toi (q.v.). After the Revolution of 1830 he was appointed Prefect of the Department of Seine, and in Lafayette's ministry a member of the Council of State. In a few months, however, he resigned his office of Prefect and declined the post of Ambassador at Constantinople, offered him by Louis Philippe. After Casimir-Périer became Minister, he also lost his place in the Council of State. He now began his career in the Chamber of Deputies as the leader of the so-called "dynastic opposition," and became the hope of all who desired the carrying out of the principles of the July Revolution. He essentially contributed to the removal of the Doctrinaires (q.v.) from office, in February, 1836, and energetically opposed the ministry of Molé, even supporting the Doctrinaires in accomplishing its overthrow, in 1839. The same year he visited England and Scotland. When, in 1840, Thiers was placed at the head of the government, Barrot for the first time declared himself in favor of the ministerial policy on the Eastern Question. On the return of Guizot to office, his opposition to the government was renewed. Taking a conspicuous part in the reform movement of 1847, he attended several of the provincial reform banquets which preceded the Revolution of 1848. On the outbreak of the struggle of February 23, when Louis Philippe called upon Thiers to form a new ministry, Barrot was appointed President. His advice to the King to withdraw his troops proved fatal to the throne of July. In the last sitting of the Chamber of Deputies Barrot supported the claim of the Comte de Paris to the throne, and the regency of the Duchesse d'Orléans. Under the presidency of Louis Napoleon he was for

some time a minister, and conducted the government with success till Oct. 31, 1849, when he retired from active political life. He accepted no office under the Second Empire, but took part in the conference in favor of Poland, held at Paris in 1864. In 1872 he was made a Councilor of State and Vice President of the Council. Consult his *Mémoires posthumes* (Paris, 1875–77).

**BAR'ROW.** A term applied to several geographical points in honor of the famous traveler, Sir John Barrow (q.v.). The most important of these are Point Barrow, in lat. 71° 23′ N. and long. 156° 31′ W., marking the northern extremity of America; Cape Barrow (q.v.), on Corondion Gulf; Barrow Strait, a channel extending west of Baffin Bay from lat. 73° 45′ to 74° 40′ N., with an average breadth of 40 miles (Map: America, North, C 2). It is a continuation of Lancaster Sound, connecting Baffin Bay with Melville Sound. It was discovered by Parry in 1819.

**BARROW.** A river in the southeast of Ireland, and next to the Shannon the largest in the island (Map: Ireland, E 4). It rises in the Slieve Bloom Mountains and after a short flow eastward turns south to the Atlantic, where it forms, in conjunction with the Suir (q.v.), the Waterford harbor. Its entire length is about 120 miles, and it is navigable for 300-ton steamers as far as New Ross, about 25 miles from its mouth. Barges ascend as high as Athy, the head of navigation, where the Barrow is connected with the Grand Canal. Its principal tributary is the Nore.

**BARROW.** An artificial mound of earth or stone, usually erected as a sepulchral monument or tumulus, common in Great Britain. See EUROPE, PEOPLES OF.

**BARROW,** CAPE. See BARROW, 1.

**BARROW,** or **BARROWE,** HENRY (?1550–93). An English church reformer. He took a B.A. degree at Cambridge in 1570, became a member of Gray's Inn in 1576, was interested by John Greenwood in church reforms, and influenced by the works of Robert Browne, founder of the Brownists. In 1586, while studying theology, he visited Greenwood in the Clink Prison and was thereupon seized. He was three times examined by the ecclesiastical authorities and with Greenwood was imprisoned in the Fleet. In collaboration with Greenwood he wrote several tracts and books. He also published the interesting *Brief Discovery of the False Church* (1590). With Greenwood he was, in 1593, indicted for various alleged offenses and hanged at Tyburn. By many he has been regarded as one of the founders of Congregationalism. For an exposition of this view, consult H. M. Dexter, *Congregationalism of the Last Three Hundred Years as Seen in its Literature* (New York, 1880).

**BARROW,** ISAAC (1630–77). An eminent English theologian and mathematician. He was born in London and was educated at the Charterhouse and the University of Cambridge. He was appointed professor of geometry at Gresham College in 1662 and in the following year was made Lucasian professor of geometry at Cambridge. He resigned the latter appointment in 1669 in favor of his pupil, Isaac Newton. In 1672 he became master of Trinity College and to his efforts is due the foundation of the valuable library of that institution. In 1675 he was nominated vice chancellor of the university. He died two years later at the age of 47. Of his original mathematical works, the principal are his *Lectiones Geometricæ* (London, 1669) and *Lectiones Opticæ* (Cambridge, 1674). Noteworthy are also his *Euclidis Elementa* (1655), *Archimedis Opera* (1675), and *Apollonii Conicorum, lib. iv* (1675). A Latin edition of his mathematical works, some of which exist also in English translations, was prepared in 1860 by Whewell. The best edition of the *Theological Works* of Barrow, including his Latin poems and a notice of his life by Whewell, has been prepared by the Rev. A. Napier (9 vols., Cambridge (1859). The Davy Manuscripts in the British Museum contain another excellent biography of Barrow. The mathematical contributions of Barrow paved the way for the introduction of the differential calculus, his treatment of tangents approaching closely the methods of the fluxional calculus of Newton. In another field his *Treatise on the Pope's Supremacy* (posthumous) is generally recognized as one of the very best works of its kind, and no less celebrated are his sermons.

**BARROW,** SIR JOHN (1764–1848). An English traveler and writer, born at Ulverston. At an early age he devoted himself to the study of mathematics and astronomy. He visited Greenland with a whaler about 1784 and from 1786–91 taught mathematics at Greenwich. In 1792 he received an appointment as private secretary and keeper of accounts to Lord Macartney, Ambassador to China, and availed himself of this opportunity to learn the Chinese language and to collect valuable materials afterward published in part in the *Quarterly Review* and in his *Travels to China* (1804). When Lord Macartney became Governor of Cape Colony, Barrow made extensive excursions in the interior of the country, which he described in his *Travels in South Africa* (2 vols., 1801–04). He returned to London in 1804 and was appointed by Lord Melville Secretary to the Admiralty, which post he continued to hold till 1845. He published: *A Voyage to Cochin-China in the Years 1792 and 1793* (1806); *The Life of Macartney* (2 vols., 1807); *A Chronological History of Voyages into the Arctic Regions* (1818); *An Autobiographical Memoir* (1847); *Sketches of the Royal Society.* More than almost any other Englishman of his time, he promoted Arctic discoveries. His name was given to Barrow Strait, Cape Barrow, and Point Barrow. With him also originated the idea of the Royal Geographical Society, founded in 1830, of which he was vice president till his death.

**BARROW,** POINT. See BARROW, 1.

**BARROW-IN-FURNESS.** A seaport and county borough in Lancashire, England, on the southwest coast of Furness Peninsula, on the Irish Sea (Map: England, C 2). It is 8 miles southwest of Ulverston and 18 miles northwest of Lancaster. The town is built on a rectangular plan. The chief of several fine public buildings is the town hall, and the handsome Gothic church of St. George. The municipality maintains a public and branch libraries, a school of science and art; owns its water works, gas, and electric light plants, markets, abattoirs, and cemetery. Its importance as a great manufacturing centre dates from the discovery in 1840 of rich hematite ore in the neighborhood and the subsequent establishment of mines and smelting works. There are several fine docks, and among the numerous industrial establishments are foundries, engineering works, extensive ship-

building yards, ship-armor and wire works, jute and paper factories. Copper as well as iron ore is obtained in considerable quantities near Barrow. The chief export trade is pig iron, steel rails, and ore. Its imports include timber from Sweden and Canada, coal from Wales, and preserved provisions from the United States. A large cattle trade is carried on with Belfast. There is regular steam communication with Glasgow and Belfast and the Isle of Man. The town takes its initial name from Barrow Island, a traditional burial place of Norse rovers, and now the central point of the harbor and the seat of its shipbuilding industries. The interesting and picturesque ruins of the twelfth century Cistercian Abbey of Furness are within 2 miles of the town, and there are ruins of an ancient castle on Piel Island. The island of Walney lies opposite Barrow, and in 1904–05 the British government built there a fort and undertook the erection of a bridge across the narrow channel separating the island and the mainland. In 1847 Barrow was a fishing village of 300 inhabitants. Pop., 1891, 51,712; 1901, 57,584; 1911, 63,775. Consult Richardson, *Furness, Past and Present* (Barrow, 1880).

**BARROWS,** David Prescott (1873– ). An American ethnologist and educator. He was born in Chicago and graduated from Pomona College, Cal., in 1894. Post-graduate studies he took at the University of California, Columbia University, and the University of Chicago, receiving from the last-named institution the degree of Ph.D in 1897. He spent a number of years in the Philippines, as superintendent of the schools at Manila (1900), chief of the Bureau of Non-Christian Tribes (1901), and as director of education in the islands (1903–09). In 1910 he became professor of education and dean of the Graduate School at the University of California and a year later accepted the chair of political science at that institution. Besides reports on the ethnology of the Philippines and on the progress of education in those islands, he wrote *The Ethno-Botany of the Coahuilla Indians* (1900), and *A History of the Philippines* (1903; new ed., 1912).

**BARROWS,** Elijah Porter (1807–88). An American clergyman, educator, and author, born at Mansfield, Conn. He graduated at Yale in 1826, was ordained in 1832, and from 1835 to 1837 was pastor of the first Free Presbyterian Church in New York City. From 1837 to 1852 he was professor of sacred literature in Western Reserve College, Ohio, and from 1853 to 1866 professor of Hebrew language and literature at the Andover Theological Seminary. He was appointed in 1872 to the chair of Hebrew at Oberlin College, Ohio. The degree of D.D. was conferred upon him in 1858 by Dartmouth College. He contributed extensively to the *Bibliotheca Sacra;* was an editor of the *Bible With Notes* of the American Tract Society, and published a *Companion to the Bible* (1867), *Sacred Geography and Antiquities* (1872), and *Manners and Customs of the Jews* (1884).

**BARROWS,** John Henry (1847–1902). An American clergyman and educator, born at Medina, Mich. He graduated at Olivet College, Mich., in 1867, studied at Yale, Union, and Andover theological seminaries, and, after holding pastorates at Lawrence, Mass., and East Boston, Mass., was pastor of the First Presbyterian Church of Chicago from 1881 to 1896. He organized and was president of the unique World's Parliament of Religions, held at Chicago, in 1893. In 1896–97 he lectured throughout the Indian Empire. He was Morse Lecturer at the Union Theological Seminary in 1898 and in the same year was elected president of Oberlin College, Ohio. As a pulpit orator and occasional speaker, he was widely and most favorably known. His publications include: *The Gospels Are True Histories* (1890); *I Believe in God* (1891); a *History of the World's Parliament of Religions* (2 vols., 1893); a *Life of Henry Ward Beecher* (1893); *The Christian Conquest of Asia* (Morse Lectures, 1899). Consult M. E. Barrows, *John Henry Barrows: A Memoir* (New York, 1905).

**BARROWS,** (Katharine) Isabel (Hayes) Chapin (1845–1913). An American editor and penologist, born at Irasburg, Vt. After graduating from Adams Academy at Derry, N. H., in 1862, she studied medicine in New York City and received the degree of M.D. Two additional years of study she spent at the universities of Leipzig and Vienna. In 1863 she was married to William Wilberforce Chapin, a missionary to India. He died in 1865, and two years later she became the wife of Samuel June Barrows (q.v.). In early life she was employed by the Department of State at Washington as a stenographer, the first woman to hold such a position in the department. For 20 years she edited the *Proceedings of the National Conference of Charities and Correction,* and for 16 years she was assistant editor of the *Christian Register.* Notable service was rendered by her also as phonographic secretary to the National Prison Association and, during 17 years, as secretary to the Lake Mohonk conferences. Mrs. Barrows was well known as an editorial contributor to *The Independent, The Outlook, The Survey,* etc. She wrote *The Shaybacks in Camp,* with S. J. Barrows, and *A Sunny Life: The Biography of Samuel June Barrows* (1913).

**BARROWS,** Samuel June (1845–1909). An American author and philanthropist. He was born in New York City, May 26, 1845. After finishing his school days he learned telegraphy and shorthand and became a newspaper reporter. From 1867 to 1869 he was secretary to William H. Seward; in 1870 and 1871, in the bureau of rolls and archives, State Department, Washington; 1871–74, a student in the Harvard Divinity School, Cambridge, Mass., acting also as Boston correspondent of the *New York Tribune,* and in the summer of 1873 he went in this capacity on the Yellowstone Expedition with Generals Stanley and Custer, and in that of 1874 on the Black Hills Expedition. In 1874 and 1875 he was a student in Leipzig. In 1876 he became pastor of the First Church (Unitarian), Dorchester, Boston, Mass.; in 1881, editor of *The Christian Register,* Boston; in 1896, commissioner of the United States on the International Prison Committee. He was a member of the Fifty-fifth Congress (1897–99), and represented the House of Representatives at the Interparliamentary Congress on Arbitration at Brussels (1897), Christiania (1899), and Paris (1900). In the autumn of 1900 he became corresponding secretary of the Prison Association of New York. Besides editing the biography of Rev. Thomas J. Mumford (Boston, 1879), an antiquarian report on the *Records of the First Church, Dorchester, 1634–1736* (1880), the memorial of Ezra Abbot, D.D., LL.D. (Cambridge, 1884),

and Theodore Parker's *West Roxbury Sermons, 1837–48* (1892), and writing elaborate reports for the United States government on penological matters, he published: *The Doom of the Majority of Mankind* (1883); *A Baptist Meeting-House; The Staircase to the Old Faith, the Open Door to the New* (1885); and (with Mrs. Barrows) *The Shaybacks in Camp* (1887); *The Isles and Shrines of Greece* (1898); *Reports* of International Prison Conferences (1900–05).

**BARROW STRAIT.** See BARROW, 1.

**BARRUNDIA,** bär-rōōn'dē-ä, JOSÉ FRANCISCO (1779–1854). A Central American statesman, born in Guatemala. He was prominent in the revolt against Spain and in 1813 was condemned to death for treason, but made his escape. In 1823–24 he was a member of the first Constitutional Convention of Central America and introduced the measure which effected the abolition of slavery. He was President of Central America in 1829–30 and of the Confederation of Honduras, Nicaragua, and Salvador in 1851–52. In 1854 he came to the United States as envoy from Honduras, with the purpose of negotiating for the annexation of that state to the American republic, but died before anything had been accomplished.

**BARRY.** A seaport town and railway terminus in Glamorganshire, Wales, 7 miles southwest of Cardiff. It has fine docks, the largest of which was opened in 1889, and a tidal basin covering 90 acres between the mainland and Barry Island. There is a large export trade in coal, and iron and its manufactures. The municipality is particularly progressive; it owns gas and water works, abattoirs, cemeteries, and maintains public schools, a public library, and reading rooms, a large market, now used as a concert hall, garden allotments, parks, several hospitals, and a sanatorium. It initiated the prohibition of unlicensed houses for lodging seamen and instituted a system of licensed houses. Pop., 1891, 13,300; 1901, 27,000; 1911, 33,763.

**BARRY** (Fr. *barré*, p.p. of *barrer*, to bar). In heraldry, the term applied to a shield which is divided transversely into a certain even number of equal parts by bars of two alternating colors. *Barry-bendy* is where the shield is both barred and bended so as to present a lozenged surface. *Barry-pily* is where the shield is divided by bars and diagonal lines so as to show piles or wedge-shaped figures.

**BARRY,** ALFRED (1826–1910). An English bishop. He was born in London and was educated at King's College, London, and at Trinity College, Cambridge. He was head master of the grammar school at Leeds from 1854 to 1862 and became principal of Cheltenham College in 1862 and of King's College, London, in 1868. He was appointed examining chaplain to the Bishop of Bath and Wells in 1869, became canon of Worcester in 1871, and canon of Westminster in 1881. From 1884 to 1889 he was primate of Australia, metropolitan of New South Wales, and Bishop of Sydney. He was made canon of Windsor in 1891 and Assistant Bishop in West London in 1897. He was rector of St. James's, Piccadilly, in 1895–1900. He wrote: *Introduction to the Old Testament* (1856); *Lectures on Christianity and Socialism* (1890); *England's Mission to India* (1895); *Hulsean Lectures* (1895); *The Position of the Laity* (1903); *The Christian Sunday* (1905); *The Law of Faith Perfected in Christ* (1908).

**BARRY,** SIR CHARLES (1795–1860). An English architect. He was born at Westminster, May 23, 1795. Educated at private schools in Leicestershire and Bedfordshire, he was indentured to a firm of architects at Lambeth. At the age of 22 he went to Italy. A wealthy compatriot, attracted by the beauty of his drawings, took him in 1818 to Egypt. He also visited Greece and Palestine. On his return to England, in 1820, he designed a church at Brighton, the Sussex County Hospital, and the Manchester Athenæum, a building in the Grecian style, and built King Edward's Grammar School at Birmingham, the latter esteemed the most beautiful of his works. In London he designed the very successful Traveler's Club (1832) and the Reform Club (1837), both in Pall Mall, and the College of Surgeons, Lincoln's Inn Fields. After the burning of the old Houses of Parliament in 1834, in a public competition Barry's design for the new building was adjudged the best (1836). The work was commenced in 1840, and on Feb. 3, 1852, Queen Victoria opened the Victoria Tower and Royal Gallery in state and on the occasion knighted the architect. Chosen a Royal Academician in 1844, Sir Charles was also a Fellow of the Royal Society, of the Society of Arts, and of the Institute of British Architects.

**BARRY,** bä'rē', COMTESSE DU. See DU BARRY.

**BARRY,** EDWARD MIDDLETON (1830–80). An English architect, the son and pupil of Sir Charles Barry, whom he succeeded as architect of the Houses of Parliament. He built the new Covent Garden Theatre, the new opera house in Malta, the Charing Cross and Star and Garter hotels, and the New National Gallery in London.

**BARRY,** ELIZABETH (1658–1713). A famous English actress, whose dramatic powers seem to have been latent until awakened by her lover, the Earl of Rochester. Though she was more than once dismissed as unfit for the stage, he wagered, so the story goes, that in six months he would make her a first-rate actress. When, after his tuition, she at length appeared at Dorset Garden as the Queen of Hungary in *Mustapha* (1673?), her success justified his prediction. She came to be considered the greatest actress of her time and created, it is said, 112 different rôles. As Monimia, which she played to Betterton's Castalio in *The Orphan*, and as Belvidera in *Venice Preserved*, she was perhaps most celebrated and delighted the heart of their author, Otway, who was devoted to her. Among her other tragic parts were Isabella, in Southerne's *Fatal Marriage;* Zara, in Congreve's *Mourning Bride;* Cassandra, in Dryden's *Cleomenes;* and Calista, in *The Fair Penitent*. She succeeded also in comedy and created the character of Lady Brute, in the *Provoked Wife* of Vanbrugh. Her power of exhibiting every emotion was extraordinary. The utterance of her phrase, "Ah, poor Castalio!" in *The Orphan*, was particularly famous for being always accompanied by her own tears as well as those of the audience. She is stated, on the authority of Cibber (*Apology*, ch. v.), to have been the first actress to receive a "benefit," which in her case was by royal command. She became wealthy and retired from the stage to the village of Acton some three years before she died. Consult: Genest, *History of the English Stage* (Bath, 1832); Cibber, *Apology*, ed. Bellchambers (London, 1822); Doran, *Annals of the*

*Stage*, ed. Lowe (London, 1888); Baker, *English Actors from Shakespeare to Macready* (New York, 1879); Galt, *Lives of the Players* (London, 1831); Fyvir, *Tragedy Queens of the Georgian Era* (New York, 1909).

**BARRY**, JAMES (1741–1806). An Irish historical painter. He was born at Cork, Oct. 11, 1741, the son of a sea captain and innkeeper, and studied art in the drawing school of West at Dublin. One of his early paintings attracted the attention of Burke, who brought him to London and enabled him to study for five years in Rome. After his return to London in 1770 his classical paintings caused great controversy and obtained him few commissions; but he was elected to the Royal Academy in 1773. On his own offer he painted, on the walls of the great room of the Society of Arts at the Adelphi, six colossal canvases representing the "Progress of Human Culture." They were all 11 feet 6 inches in height, and the largest were 42 feet long. During the six years required by this work he received no pay, supporting himself by engraving at night. In 1782 he was appointed professor of painting to the Royal Academy, but his criticisms and controversies with the members caused his expulsion from the institution in 1792. After this he lived in poverty and retirement until his death, Feb. 22, 1806. His other paintings, besides the decorations mentioned above, include "Philoctetes in the Isle of Lemnos," "Adam and Eve" (South Kensington Museum), and "Venus Rising from the Sea."

Barry was a man of high ideals, but lacked the technical ability necessary for their expression in painting. A thoroughgoing classicist, he went so far, in his "Death of General Wolfe," as to depict all the figures nude. He was also an etcher and a writer of some force. His letters and writings were collected and published with a memoir in 1809. Consult Colvin, "James Barry," in *Portfolio* (London, 1873); Cunningham, *Lives of the Most Eminent British Painters, Sculptors, and Architects* (London, 1820–33).

**BARRY**, JOHN (1745–1803). An American naval officer. He was born in Ireland, came to America about 1760, and, settling in Philadelphia, acquired wealth as master of a merchant vessel. He was appointed to command the brig *Lexington* in 1776 and captured the tender *Edward*, the first ship ever taken by a commissioned officer of the United States navy. In 1777 he captured a British war vessel in the Delaware and in 1778 was given command of the *Raleigh*, which was soon afterward pursued and driven ashore by a British man-of-war. In 1781, while returning from France, he captured two vessels, but was severely wounded. He was first senior officer, with rank of commodore, after the reorganization of the navy in 1794. Consult Martin I. J. Griffin, *Commodore John Barry* (Philadelphia, 1903).

**BARRY**, JOHN DANIEL (1866– ). An American playwright, essayist, and writer of novels, born in Boston, Mass. He graduated from Harvard University in 1888 and two years later began literary and journalistic work in New York City, acting for a time as dramatic critic for *Harper's Weekly* and later for *Collier's*. He was made instructor in diction and interpretation at the American Academy of Dramatic Arts, and lecturer on literary and social subjects for the New York City Board of Education. Several plays written by him were produced successfully in New York and other cities. Besides short stories and essays contributed to magazines, his writings include: *The Intriguers* (1896); *Julia Marlowe* (1899; 1907); *A Daughter of Thespis* (1903); *The Congressman's Wife* (1903); *Our Best Society* (1905); *Idea and Other Allegories* (1913); *Intimations*, a book of essays (1913); *Outlands* (1914).

**BARRY**, SIR JOHN WOLFE-WOLFE (1836– ). An English engineer, born in London, and educated at Trinity College, Glenalmond, and at King's College, London. He was resident engineer during the construction of the bridges over the Thames and the stations at Charing Cross and Cannon Street and afterward built the present bridge over the Thames at Blackfriars, the Barry Dock, near Cardiff (the largest in Great Britain), the Tower Bridge, and numerous railroads and other engineering works. During a visit to the Argentine Republic in 1872 he planned the railroad from Buenos Ayres to Rosario. He was consulting engineer on the underground railway of Glasgow and in 1903–05 was Royal Commissioner of London Traffic. His publications include: *Railway Appliances* (in the series entitled "Text-books of Science," 1874–92); *Lectures on Railways and Locomotives* (1882); *The Tower Bridge* (1894).

**BARRY**, MARTIN (1802–55). An English physiologist, born at Fratton, Hants. He studied medicine in London, at the University of Edinburgh, and under Tiedemann at Heidelberg. He wrote much on physiological subjects and especially on animal development and embryology. Until the publication of his papers in the *Philosophical Transactions* of the Royal Society of London in 1840–43, it was not known that spermatozoa actually penetrate the ovum. He also first demonstrated the segmentation of the yolk in mammals. His means being ample, Barry gave his professional services freely to the poor. He acted as house surgeon to the Edinburgh Royal Maternity Hospital.

**BARRY**, SPRANGER (1719–77). A British actor, born in Dublin. He first played at the Theatre Royal in his native city in February, 1744, and remained there two years. On Oct. 4, 1746, he appeared for the first time in London, as Othello at the Drury Lane Theatre, where his gifts were quickly recognized, and it was not long before he and Garrick were playing Macbeth and Hamlet in alternation upon the same stage. But Garrick had control of the house, and in 1750 Barry withdrew to Covent Garden. There he and Mrs. Cibber played Romeo and Juliet, while Garrick and Mrs. Bellamy were appearing in the same piece at Drury Lane, a rivalry continued to the weariness of the town, as expressed in the well-known line, "A plague o' both your houses!" In 1758 Barry planned a new theatre in Dublin and three years later one in Cork; but as a manager he did not succeed, and he returned to London. For a time he played at the Haymarket and then, after 1767, under Garrick's management at Drury Lane. He married Mrs. Dancer in 1768 and went with her in 1774 to Covent Garden. Barry won many laurels in Shakespearean tragedy and created a number of parts, among them Mahomet, in Johnson's *Irene* (1749); Young Norval, in Home's *Douglas* (1757); and Evander, in Murphy's *The Grecian Daughter* (1772). Consult: Genest, *History of the English Stage* (Bath, 1832); Doran, *Annals of the Stage*, ed.

Lowe (London, 1888); Pollock, in *Actors and Actresses of Great Britain and the United States*, ed. Matthews and Hutton (New York, 1886).

**BARRY,** MRS. SPRANGER (1734–1801), born Ann Street; afterward successively Mrs. Dancer, Mrs. Barry, and Mrs. Crawford. An English actress. She was born at Bath, but her connection with the stage began probably in York or Portsmouth, her early career as an actress being spent with her first husband, Mr. Dancer. In November, 1758, she appeared as Cordelia with Spranger Barry in *Lear*, at his new theatre in Dublin. After several years there she went with him to London (1767), married him the next year, and played with him until his death. Afterward she married a Mr. Crawford, and continued upon the stage for about 20 years, playing in London and for a time (1781–83) in Dublin. She was a powerful actress, with a voice which at vehement moments made an extraordinary impression. Her acting of Desdemona was considered almost a creation of the part, which up to that time had been little thought of. The list of her notable rôles includes also, besides Cordelia, Monimia, in *The Orphan*, and Lady Randolph, in *Douglas*, in which she is said to have made her last appearance, some three or four years before her death. Consult the authorities referred to in the preceding article.

**BARRY,** THOMAS HENRY (1855–1919). An American soldier, born in New York City. He graduated at the United States Military Academy and served on frontier and on garrison duty. In 1900-01 he was chief of staff of the Division of the Philippines, and he was made a brigadier general, United States army, in 1903. He was promoted to the rank of major general in 1908, commanded the army of Cuban pacification in 1907-09, and was superintendent of the United States Military Academy from 1910 to 1912.

**BARRY,** WILLIAM FARQUHAR (1818–79). An American soldier, born in New York City. He graduated in 1838 at the United States Military Academy, assisted Major Ringgold in the organization of the first battery of light artillery in the United States army, and served (1846–48) in the Mexican War. He also served in the Seminole War from 1852 to 1853; he was on frontier and garrison duty from 1853 to 1861 and in 1858 was a member of the board for the revision of the system of light-artillery tactics. He entered the Civil War as major of the Fifth Artillery; from 1861 to 1862, with rank of brigadier general of volunteers, was chief of artillery of the Army of the Potomac, and in 1863–64 was chief of artillery of the defenses of Washington, D. C. From 1864 to 1866 he was chief of artillery on the staff of General Sherman (Military Division of the Mississippi) and in 1866 was mustered out of the volunteer service as colonel of the Second Artillery and brevet major general United States army. From 1866 to 1867 (at the time of the attempted Fenian raids into Canada) he was in command of the northern frontier; and from 1867 to 1877 he was in command of the artillery school for practice at Fort Monroe, Va., and from 1877 to 1879 of Fort McHenry, Md. With Gen. J. G. Barnard, he published *Reports of the Engineer and Artillery Operations of the Army of the Potomac* (1863).

**BARRY,** WILLIAM FRANCIS (1849– ),



An English Roman Catholic clergyman and author. He was born in London and was educated at Oscott and the English College, Rome. From 1873 to 1877 he was vice president and professor of philosophy at Birmingham Theological College and professor of divinity at Oscott, 1877–80. From 1883 he was in charge of the small parish of Dorchester, near Oxford, and devoted his time largely to literary work. He delivered addresses in America in 1893. He was appointed rector of St. Peter's, Leamington, in 1908. Besides a large number of articles on metaphysical and ethical subjects, he wrote: *The News Antigone*, a powerful study of modern views in regard to marriage (1887); *The Place of Dreams* (1894); *The Two Standards* (1898); *Aidan Massiter* (1900); *The Wizard's Knot* (1901), *The Dayspring* (1903); *Newman* (1904); *Heralds of Revolt* (1904); *Renan* (1905); *The Papal Monarchy from St. Gregory the Great to Boniface, 590–1303* (1902); *The Papacy and Modern Times* (1911).

**BARRY,** WILLIAM TAYLOR (1785–1835). An American politician and jurist. He was born at Lunenburg, Va., graduated at William and Mary College, and practiced law at Lexington, Ky. Having already served in the State Legislature, he was in 1810 elected to Congress. He fought in the War of 1812, entered the Senate in 1814, and in 1816 resigned to accept an appointment as justice of the State Supreme Court. In 1829–35 he was Postmaster-General, and was the first incumbent of the office to sit in the Cabinet. In 1835 he was appointed Minister to Spain and died on the voyage to that country.

**BARRY CORN'WALL.** See PROCTER, BRYAN WALLER.

**BARRY LYNDON,** lĭn'don. The title of one of Thackeray's lesser novels. It appeared serially in *Fraser* (1844) and narrates the career of an Irish adventurer. It was published in book form in 1853.

**BARRYMORE,** ETHEL (MRS. RUSSELL T. COLT) (1879– ). An actress born in Philadelphia. She attracted general attention in Clyde Fitch's *Captain Jinks* in 1900. She played in London in the title rôle of *Cynthia* in 1904, starred in *A Doll's House* in 1905, and in Barrie's *Alice-Sit-by-the-Fire* (1906), played the part of Mrs. Jones in *The Silver Box* in 1907, Zoë Blundell in *Mid-Channel* in 1910, and Stella Ballantyne in *The Witness for the Defense* in 1911. The following year she appeared in *The Twelve-Pound Look*, a satire by James M. Barrie, and *Cousin Kate*, and in 1913 in *Tante*, a comedy by C. Haddon Chambers (from a novel by Anne Douglas Sedgwick).

**BARRYMORE,** MAURICE (1847–1905). An actor and playwright, named Herbert Blythe. He was born in India and educated at Cambridge, England, but, having gone upon the stage, came to America in 1875, where he played with many of the best-known actors. The next year he was married to Georgiana Drew of the well-known actor family. His first season here was at Boston in *The Shaughraun*. In 1882 he became leading man for Madame Modjeska; in 1887, for Mrs. Langtry; in 1893, for Mrs. Bernard Beere; and the following season for Olga Nethersole. In 1899 he supported Mrs. Fiske, in *Becky Sharp*, playing very effectively the part of Rawdon Crawley. He wrote *Nadjeska*, which was produced by Madame Modjeska in 1884, and other plays. Consult Coward, in *Famous American Actors of To-day*, ed. McKay and Wingate

(New York, 1896), and Montrose J. Moses, *Famous Actor-Families in America* (New York, 1906).

**BAR SHOT.** A double-headed shot, in shape like a dumb-bell, consisting of a bar, with a half ball or round head at each end. Bar shot were formerly employed in naval warfare for the purpose of destroying masts and rigging.

**BARSU'MA,** or **BARSUMAS I** (?–c.489). A Nestorian (q.v.), who became Bishop of Nisibis and Metropolitan, 435. He induced the King of Persia to expel the Christians who followed the Greek fathers and to put Nestorians in their place (462). He founded the theological school at Nisibis, which sent missionaries to various countries. He married a nun (Mammæa) and maintained the right of all priests to marry. In Persia the Nestorians venerate him as the founder of their faith.

**BAR-SUR-AUBE,** bär'sụ'rōb' (Fr. Bar on the Aube). A town in the department of Aube, France, on the right bank of the river of that name, 34 miles by rail east of Troyes. It is an ill-built, ancient town, numerous old coins and urns attesting that the Romans must have had a station here. Bar-sur-Aube was destroyed by the Huns in the fifth century, but was rebuilt soon after, when it became a place of commercial importance. A chapel on the bridge which crosses the Aube marks the spot from which the Bastard of Bourbon was hurled into the river by command of Charles VII in 1441. Bar-sur-Aube is noteworthy as the place where the council of the allied sovereigns, which decided the plan of the campaign ending in the first fall of the Empire, was held on Feb. 25, 1814; and where, two days after, the French were defeated by the allies under the chief command of Schwarzenberg. The leading manufactures include leather, flour, and agricultural implements, and there is trade in wine, grain, and wool. Pop., 1896, 4548; 1901, 4339; 1906, 4507; 1911, 4533.

**BAR-SUR-SEINE,** sụr-sān', (Fr. Bar on the Seine). An ancient town of France, in the department of Aube, pleasantly situated on the left bank of the Seine, 21 miles by rail southeast of Troyes (Map: France, N., K 4). The river is here crossed by a double bridge. The town possesses a small museum, and its most noteworthy building is the church of St. Etienne, dating from the sixteenth century. Bar-sur-Seine was fortified until the end of the fifteenth century and has been sacked several times. Pop., 1901, 3062; 1906, 3187; 1911, 3107.

**BART,** JEAN. See BARTH, JEAN.

**BARTAS,** bär'tà', GUILLAUME DE SALLUSTE DU (1544–90). A French Huguenot poet, diplomat, and soldier. He was born at Montfort and died from wounds received in the battle at Ivry. His *La création* (1578), a religious poem, was widely esteemed, passing through 30 editions in six years. He wrote also *Judith Urania, la seconde semaine de la création,* parts of which, as of *La création,* were translated by King James VI, Thomas Hudson, William Lisle, and Thomas Winter. Joshua Sylvester's version of *La création* (1598) was once very widely read in both England and America. The original has lines of fine inspiration emerging from a maze of dreary absurdity.

**BARTELS,** bär'tĕls, ADOLF (1862– ). A German journalist and poet, born at Wesselburen, in Holstein, and educated at Leipzig and Berlin. His poetic and dramatic works include: *Gedichte* (1889); *Dichterleben* (1890); *Aus der meerumschlungenen Heimat* (1895); *Der dumme Teufel,* a mock epic (1896); and *Martin Luther,* a trilogy (1903), and some historical novels. His collected poems appeared in 1904. In the field of criticism and literary history he published *Friedrich Gessler* (1892); *Die deutsche Dichtung der Gegenwart* (1897); *Geschichte der deutschen Litteratur* (2 vols., 1901–02); *Adolf Stern* (1905); *Heinrich Heine* (1906); *Gerhart Hauptmann* (1906); *Deutscher Litteratur Einsichten und Aussichten* (1907); *Deutsches Schrifttum* (1911).

**BARTENSTEIN,** bär'ten-stīn. A town of East Prussia, situated on the Alle, 35 miles south of Königsberg (Map: German Empire, J 1). It possesses a gymnasium, several churches, a synagogue, an orphan asylum, a military school, and is the seat of a provincial court. There are manufactures of stoves and wagons, machine shops, iron foundries, breweries, and saw mills, and considerable trade in grain. Bartenstein is noted chiefly as the place where the treaty was concluded between the Prussians and the Russians on April 26, 1807. Pop., 1900, 6779; 1910, 7343.

**BARTENSTEIN,** bär'ten-stīn, JOHANN CHRISTOPH, BARON (1689–1767). An Austrian statesman, born at Strassburg. In 1727 he became Secretary of State under the Emperor Charles VI. He retained this position under Maria Theresa until Kaunitz was summoned to the Ministry of Foreign Affairs. His efforts to obtain European recognition of the Pragmatic Sanction of Charles VI proved unsuccessful, and his policy under Maria Theresa led to the humiliating treaties of peace negotiated at Breslau, Dresden, and Aix-la-Chapelle.

**BAR'TER** (OF. *barater, bareter,* to cheat). In commerce and political economy, the exchange of one commodity for another commodity, as contrasted with the sale of commodities for money. Among primitive peoples barter was doubtless the only method of exchange and is still pursued in trading with savage peoples. The trade of modern times, with its development of credit, is largely a system of barter in a modified form. This is seen most clearly in the exchanges between nations, where merchandise imports are balanced off against merchandise exports, and differences only liquidated by shipment of coin or bullion. The important difference between this modern barter and that of primitive peoples lies in the fact that money intervenes as a standard by which the commodities are measured, even though little money changes hands.

**Barter in Law.** Some courts have held that a statute which refers in terms to a sale of goods has no application to a barter of them, while other courts have held the opposite view. A power to an agent, or representative of the owner, to sell property is construed strictly, and hence the possessor of such a power, it is generally held, cannot barter the property. For most purposes, however, the rules governing sales are equally applicable to barter or exchange transactions. Indeed, courts of the highest authority have used barter and sale as interchangeable terms. Consult authorities referred to under SALE.

**BARTET,** bär'tà', JEANNE JULIE REGNAULT (1854– ). A French actress. She was born at Paris and studied at the Conservatoire (1871–72). She was then engaged at the Vaudeville,

and made her début in *L'Arlésienne*. She created the part of the Countess Zicka in Sardou's *Dora* (1877). Her first appearance at the Théâtre Français was as Mademoiselle Henderson in *Daniel Rochat* and before the end of the same year (1880) she was elected a member of the company. She has since appeared with success in *Ruy Blas, Iphigénie, Le roi s'amuse, L'Etrangère, Dénise, La souris, Thermidor, La paix du ménage, La lai de l'homme,* and *Grosse fortune.*

**BARTFELD,** bärt'fĕlt (Hung. *Bártfa*). An ancient town of Hungary, in the county of Sáros, on the Tapola, about 28 miles north of Eperies (Map: Hungary, G 2). Its chief edifices are the fine thirteenth-century Gothic church of St. Ægidius, and a handsome Rathaus dating from the fifteenth century. A statue of Empress Elizabeth was set up here in 1903. There is a considerable trade in linen. About 2 miles to the north of the town, in the midst of pine forests, are the celebrated and much-frequented chalybeate springs. Pop., 1901, 6102, mostly Slovaks.

**BARTH,** bärt. A seaport in Pomerania, Prussia, on the bay of the same name, 17 miles northwest of Stralsund (Map: German Empire, E 1). It has a good harbor, and among its institutions are a school of navigation and an establishment for single ladies of rank. It is the seat of a district court and has a church dating from the thirteenth century. Among its industries are shipbuilding, beer brewing, fish curing and packing, and the manufacture of sugar, leather, and cigars. It also has iron foundries, saw mills, and machine works. Pop., 1890, 5550; 1900, 7100; 1910, 7505.

**BARTH,** bärt, *Fr. pron.* bär, AUGUSTE (1834– ). A French Orientalist. He was born at Strassburg, March 22, 1834. He is best known by his work in connection with the religions of India. His volume, *Les religions de l'Inde* (Paris, 1879), was translated into English by Wood (London, 1882). Mention may also be made of his *Inscriptions sanscrites recuellies au Cambodge* (Paris, 1885) and of numerous monographs and reviews in *Journal asiatique, Mélusine, Mémoires de la Société de Linguistique,* etc. His annual reports on researches into the history of Indian religions, in *Revue de l'histoire des religions* (1880), are especially valuable. He is a member of the French Institute.

**BARTH,** HEINRICH (1821–65). A German explorer and traveler. He was born at Hamburg and received his education at the University of Berlin. After visiting Italy and Sicily he embarked in 1845 at Marseilles and made excursions into Tunis, Tripoli, and Barca. He afterward extended his researches into Egypt, Sinai, Palestine, Asia Minor, and Greece, and in 1849 he published, at Berlin, *Wanderungen durch die Küstenlander des Mittelmeeres.* Late in that year he and Dr. Overweg again sailed from Marseilles as the scientific companions of James Richardson, intrusted by the British government with a political and commercial mission to Central Africa. Starting from Tripoli, the travelers crossed the Great Desert with much difficulty and danger. In January, 1851, they separated, and Dr. Barth pursued his researches, for the most part, by himself. In March of the same year Richardson, and in September, 1852, Overweg, having succumbed to the climate, Barth thenceforward was entirely alone. He, however, continued his explorations, which, when he returned to Tripoli in September, 1855, had extended over 24° of latitude and 20° of longitude, from Tripoli in the north to Adamawa in the south, and from Baghirmi in the east to Timbuktu in the west—upward of 12,000 miles. The range of his investigations and the scientific manner in which he pursued them placed him in the front rank of African explorers. The result of his researches was given in his *Travels and Discoveries in North and Central Africa* (5 vols., 1857–58, published in both English and German). Afterward he made several journeys in Greece, Turkey, Asia Minor, and other countries on the Mediterranean. He also published *Reise von Trapezunt durch die nördliche Hälfte Kleinasiens nach Skutari* (1860); *Sammlung und Bearbeitung zentral-afrikanischer vokabularien* (1862–66); *Reise quer durch das Innere der Europäischen Turkei* (1864).

**BARTH,** or **BART,** JEAN (1651–1702). A French naval hero. He was born at Dunkirk and at an early age entered the Dutch navy, but on the outbreak of war between France and Holland he passed over to the French service. As persons not of noble birth could not then obtain the rank of officer in the navy, he became captain of a privateer. In this capacity he displayed astonishing bravery, so that Louis XIV dispatched him on a special mission to the Mediterranean. He became a terror to the Dutch navy and a serious menace to the commerce of Holland. On one occasion, with six vessels, he broke through a blockading fleet, shattered a number of the enemy's ships, and convoyed a transport of grain safely into Dunkirk harbor. His exploits overcame the disadvantages of his birth, and he was made lieutenant and soon after captain in the regular navy. In an action against a superior English force he was taken prisoner and carried to Plymouth, from which he made his escape in an open fishing boat to France. He cost the English and the Dutch merchants many millions, and their navies many ships. He was later ennobled by the King. Consult Badin, *Jean Bart* (Paris, 1867), and Landelle, *Jean Bart et son fils* (Paris, 1874).

**BARTH,** KARL HEINRICH (1847– ). A German musician. He was born at Pillau, Prussia, and was a pupil of Von Bülow, Bronsart, and Tausig. He was long a member of the well-known trio, Barth, De Ahna, and Hausmann, whose chamber-music recitals were widely celebrated. In 1868 he was instructor in Stern's Conservatory, and since 1871 in the Königliche Hochschule in Berlin.

**BARTH,** PAUL (1858– ). A German sociological writer. He was born at Baruthe in Silesia, Aug. 1, 1858. He is editor of the *Vierteljahrsschrift für wissenschaftliche Philosophie und Soziologie,* and a professor (*ausserordentlich*) in the University of Leipzig. He has written on philosophical subjects, but his *Philosophie der Geschichte als Sociologie,* the first volume of which appeared in 1897, is the best historical sketch of the development of sociological theory which has been published in Germany. Among Dr. Barth's other writings should be mentioned: *Geschichtsphilosophie Hegels und die Hegelianer bis auf Marx und Hartmann* (1890); *Tiberius Gracchus* (2d ed., 1893); *Beweggründen des sittlichen Handelns* (1899); *Erziehungs- und Unterrichtslehre* (1906); *Geschichte der Erziehung in Sociolo-*

*gischer und geistesgeschichtlicher Beleuchtung* (1911).

**BARTH,** THEODOR (1844–1909). A German journalist and politician, born in Duderstadt, and trained in the law at the universities of Heidelberg, Leipzig, and Berlin. He entered on the practice of his profession in Bremen in 1871, for four years was a magistrate in Bremerhaven, and after that served in the latter city until 1883 as secretary of the chamber of commerce. Having founded *Die Nation* in Berlin, he was its editor for 24 years, until it ceased publication in 1907. He joined the Liberal Union party, was elected to the Reichstag as member from Gotha in 1881, and later represented other districts up to 1898. Both in politics and as an editor he attracted much attention by his advocacy of the principles of free trade and by his opposition to the high protectionist policy of Bismarck and of the Junkers or Agrarian party. Not believing the Liberal Unionists sufficiently aggressive, he left them to join the *Deutsch-freisinnig* party in 1898 and in the same year became a member of the Prussian Landtag. From 1901 to 1903 he was again a member of the Reichstag, and in the latter year he even went so far as to unite with the Socialists in opposition to the reactionary forces in German politics. He made his last visit to the United States in 1907. His publications include: *Gegen den Staats-sozialismus* (1884); *Amerikanisches Wirtschaftsleben* (1887); *Amerikanische Eindrucke* (1896).

**BARTHEL,** bär'tel, MELCHIOR (1625–72). A German sculptor. He was born at Dresden, and studied with his father and with Johann Boehme, of Schneeberg (1640–45), and, after a long sojourn in Italy, including 17 years in Venice, settled at Dresden, where he was appointed sculptor to the court. His principal works are the colossal tomb of the Doge Giovanni Pesaro (Santa Maria dei Frari, Venice), the statue of John the Baptist (Oratory of Santa Maria, Nazareth), and a tomb in SS. Giovanni e Paolo, Venice. His numerous ivory carvings in the Green Vault at Dresden are considered superior to his more elaborate works, which are all in the manner of Bernini.

**BARTHÉLEMY,** bär'tâ'l'-mē', ANTOINE. See PROUST, ANTONIN.

**BARTHÉLEMY,** AUGUSTE MARSEILLE (1796–1867). A French poet and politician. He was born at Marseilles, studied in the Jesuit College of Juilly, and came to Paris with some reputation as a poet after the Restoration. He speedily acquired fame as a satirist, and his light but stinging verse made all Paris laugh and many statesmen wince. The ministers of Charles X were especially his prey, and satirical epics named after them, *Les Sidiennes, La Villéliade, La Corbiéréide, La Peyronnéide,* followed each other in close succession. Imprisoned for expressing Napoleonic sentiments, he was liberated by the Revolution of July and turned at once to the support of Louis Philippe. With time his popularity waned, but he continued to pour out an endless stream of brilliant verse to the day almost of his death. His fine talents, however, were too often at the disposal of the highest bidder; and he sang Napoleon III as he did the Revolution of 1830. Of his serious work, *L'Insurrection* and *Napoléon en Egypte* deserve mention.

**BARTHÉLEMY,** FRANÇOIS, MARQUIS DE (1747–1830). A French statesman. He was born at Aubagne, in the department of Bouches-du-Rhône, and after serving in the Bureau of Foreign Affairs under the Duc de Choiseul, acted as Secretary of Legation in Switzerland, Sweden, and England. The reputation he gained as negotiator of the treaties of Basel (q.v.) led to his being chosen one of the five directors in 1797. But his royalistic sympathies and his connection with the Clichians (a club of reactionaries) brought about his downfall on the 18th Fructidor (Sept. 4, 1797) and his transportation to Guiana. He escaped from there, returned to France after the 18th Brumaire (Nov. 9, 1799), and was made a senator by Napoleon, whom Barthélemy sedulously fawned upon till 1814, and then expeditiously deserted. Louis XVIII made him a Minister of State and a Marquis. In 1819 he proposed the restriction of the electoral franchise, a measure which was carried the following year. His position, however, had made him so unpopular that he was forced into retirement, where he remained until his death in 1830. Barthélemy was a man of considerable ability but slight political integrity. Consult Kaulek, *Papiers de Barthélemy* (Paris, 1887).

**BARTHÉLEMY,** JEAN JACQUES (1716–95). A French Hellenist and antiquarian, born at Cassis and remembered for his *Voyage du jeune Anacharsis* (1788), on which he labored 30 years. The voyage, or journey, of the Scythian Anacharsis involves an account of the customs, government, and antiquities of Greece, as they might have appeared to a classical traveler. The experiences of the youth are supplemented by dissertations on literature, music, economy, etc. The learning is not profound, but it is wide; the character of the supposed narrator is well sustained, and though now superseded, the work was immediately and immensely popular. It brought its author a seat in the Academy and such general regard that, though arrested during the Reign of Terror, he was immediately released by the Committee of Public Safety. He died in Paris, April 30, 1795. A modern attempt to imitate the *Anacharsis,* which was translated into English (1791) and many other languages, is the *Charicles* of Wilhelm Adolf Becker (q.v.), which has greater learning, but less charm.

**BARTHÉLEMY SAINT-HILAIRE,** bär'-tâ'l'-mē' săN' tē'lâr', JULES (1805–95). A French Orientalist, classical scholar, and statesman, best known for his commentaries and translations of Aristotle (1837–70). He was born in Paris, and in early life played an active part in radical political journalism, but became in 1838 professor of Greek and Roman philosophy in the Collège de France. He took office during the Revolution of February, 1848, but retired for a time from public and professorial life after the coup d'état of Dec. 2, 1851. He was reconciled later to the Empire and resumed his professorship in 1862. From 1871 he was again active in politics—as deputy, senator for life (1876), and Minister of Foreign Affairs (1880–81). He died in Paris. His chief works, besides the Aristotelian translations and essays, are: *De l'école d'Alexandrie* (1845); *Rapport sur le concours ouvert pour la comparaison de la philosophie morale et politique de Platon et d'Aristote, avec les doctrines des plus grands philosophes modernes*

(1854); *Sur les Védas* (1854); *Du Bouddhisme* (1855); *Mahomet et le Coran* (1867); *La philosophie dans ses rapports avec les sciences et la religion* (1889); *Étude sur François Bacon* (1890).

**BARTHEZ,** bär'tâs', or **BARTHES,** PAUL JOSEPH (1734–1806). A celebrated French physician. He studied medicine at Montpellier, became professor in the university in 1759, and acquired European renown as a practitioner and lecturer. In his principal work, *Nouveaux éléments de la science de l'homme* (1778), he set forth a new theory of life. According to this, there is in the living organism a *vital principle,* which should be distinguished, on the one hand, from the conscious and thinking mind; on the other, from the physical forces producing material transformations in the body. The life of each separate organ is but a *modus,* a particular manifestation of the "vital principle," and should not be regarded as a component part of the latter. Barthez was a keen thinker; he produced no experimental facts that might render his hypothesis immediately valuable to the biologist; yet his enlightened views had the effect of imparting a new and powerful impulse to the progress of science. He wrote also *Nouvelle mécanique des mouvements de l'homme et des animaux* (1798) and *Consultations de médecine* (1810).

**BARTHOLD,** bär'tôlt, FRIEDRICH WILHELM (1799–1858). A German historian, born in Berlin. He studied theology and history at the universities of Berlin and Breslau and was appointed professor of history at Greifswald in 1831. His principal productions are the following: *Geschichte von Rugen und Pommern* (5 vols., 1839–45); *Geschichte der deutschen Stadte und des deutschen Bürgertums* (4 vols., 1850–52); *Geschichte der deutschen Hansa* (3 vols., 1853–54); *Geschichte des grossen deutschen Kriegs vom Tode Gustav Adolf's ab* (3 vols., 1841–43).

**BARTHOLDI,** bär'tôl'dê', FRÉDÉRIC AUGUSTE (1834–1904). A French sculptor. He was born at Colmar, Alsace, and at first studied painting under Ary Scheffer, but soon abandoned it for sculpture under Soitoux's influence, working thereafter by preference on a colossal scale and with architectural effects. Among his best-known works in this style are the colossal figure of "Liberty Enlightening the World," presented by France to the United States (1886; see LIBERTY, STATUE OF); a colossal group presented by France to Switzerland; the Lafayette Statue in New York (1873); and those of Lafayette and Washington in Paris (1892); and the "Lion of Belfort," an immense monument commemorating the defense of the place in the Franco-Prussian War. This last is generally considered his masterpiece.

**BARTHOLDY,** bär-tôl'dê, JAKOB SALOMO (1779–1825). A Prussian diplomat. He was born in Berlin, of Jewish parentage, and was educated at the University of Halle. He fought in the Austrian army against Napoleon, afterward entered the diplomatic service of Prussia, and accompanied the Allied armies to Paris in 1814, whence he was dispatched to Rome in the following year as Prussian Consul-General. He was a great patron of the arts. The revival of fresco painting was due largely to his influence and example. His valuable collection of antiques was bought for the Berlin Museum of Art, while the frescoes of his mansion at Rome, the so-called Casa Zuccari, were transferred in 1887 to the Berlin National Gallery.

**BARTHOLIN,** bär'tô-lĭn. A family of Danish scholars, of whom the first to win distinction was KASPAR (1585–1629). He was successively professor of rhetoric, medicine, and theology at the University of Copenhagen and published in 1611 *Institutiones Anatomicæ,* a text-book of anatomy used throughout Europe in the seventeenth century in German, English, French, and other translations. Of his sons, JAKOB (1623–53) was a distinguished Orientalist, and THOMAS (1616–80), a noted physician, naturalist, and philologist, who revised his father's *Anatomy* (1641) and was a warm defender of Harvey's doctrine of the circulation of the blood. Thomas had two sons, KASPAR (1655–1738), a distinguished anatomist, who discovered the function of the lymphatic glands and the sublingual duct and the seminal gland of the female; and THOMAS (1659–90), an antiquarian, author of *Antiquitatum Danicarum Libri Tres* (1689), a standard work. Consult J. Petersen, *Bartholinerne og Kredsen om dem* (1898).

**BARTHOLIN'S GLANDS** (named after Kaspar Bartholin, who discovered them). Two small, mucous glands, about the size of a pea, situated one on either side of the vagina. They are of the racemose type (see GLAND) and are the homologues of Cowper's glands in the male. They are of medical interest chiefly because they are prone to painful inflammation, as a result of gonorrhœal infection, and occasionally become the seat of cysts.

**BARTHOLOMAE,** bär-tô'lô-mâ, CHRISTIAN (1855– ). A German philologist and Iranian scholar. He was born at Bayreuth, June 21, 1855. After graduating from the Bayreuth Gymnasium in 1872, he studied classical philology and general philosophy at the universities of Munich, Leipzig, and Erlangen. He returned to Leipzig in 1874 to devote himself to comparative philology and Oriental studies. In 1879 he went to Halle as a member of the faculty and thence to an extra professorship at Münster, in Westphalia, in 1885. In 1898 he accepted a call to the professorial chair of Sanskrit and Indo-Germanic philology at Giessen. In 1909 he passed to the University of Heidelberg. Among his numerous and important contributions in the field of Aryan linguistics may be mentioned: *Das altiranische Verbum* (Munich, 1878); *Handbuch der altiranischen Dialekte* (Leipzig, 1883); *Arische Forschungen* (3 vols., Halle, 1882–87); *Studien zur indogermanischen Sprachgeschichte* (Halle, 1890–91); two important articles in Geiger and Kuhn's *Grundriss der iranischen Philologie* (Strassburg, 1895–96); an etymological dictionary of Avestan and Old Persian, *Altiranisches Wörterbuch* (Strassburg, 1904); *Die Gathas des Awesta* (1905); *Ueber ein Sassanides Rechtbuch* (1910).

**BAR'THOLOMÆ'US ANGLICUS,** ăn'glĭ-kŭs (Lat. *Anglicus,* English). An English scholar of the thirteenth century, erroneously styled DE GLANVILLE, author of the great mediæval encyclopædia, *De Proprietatibus Rerum,* "On the Nature of Things." He studied and taught theology at Paris and about 1230 entered the Minorite Order. His work was a source of common information on natural history and was translated into French in 1372, English in 1398, and Spanish and Dutch in the fifteenth century, and often printed. Consult *Histoire littéraire de la France,* vol. xxx (Paris, 1888).

**BARTHOLOMÉ**, bär'tō'lō'mā', PAUL ALBERT (1848– ). One of the most prominent contemporary French sculptors. He was born at Thiverval (Seine et Oise) and studied law until the age of 23. He then took up painting under Menn in Geneva and Gérôme in Paris and from 1869 to 1876 was a successful painter of genre subjects. On the death of his wife in the latter year he retired to strict seclusion and devoted himself, without a teacher, to the mastery of sculpture. After a year he completed the beautiful monument to his wife in the village churchyard of Bouillant (Oise). He then began a monument designed to represent the grief of humanity for the dead, the complete model of which, under the name "Aux Morts," was exhibited in the Salon of 1895. At the joint expense of the state and the city of Paris it was carved in limestone and erected in 1899 at the entrance of Père Lachaise Cemetery. It is one of the most sublime achievements of modern sculpture. Into the portal of a pylon-shaped mausoleum enter the nude figures of man and wife, bewailed on either side by a passionate group of mourners; within a lower entrance, typifying the grave, presides the genius of death. Among the best of his other works are: a bronze "Weeping Child" (1894, Musée du Luxembourg); a series of beautiful female nudes, such as that adorning the fountain in the Musée des Arts Decoratifs, Paris, "The Secret" (Leipzig), and the "Girl Plaiting her Hair" (Albertinum, Dresden). He also carved many portrait busts and several very original grave monuments in various Paris cemeteries, and is represented by sculptures in the museums of Marseilles, Béziers, Brussels, Mühlhausen, Düsseldorf, and Dresden. Bartholomé is par excellence the sculptor of the nude in the attitude of grief. Consult Demaison, *M. Bartholomé et le monument Aux Morts* (Paris, 1900).

**BARTHOL'OMEW**, EDWARD SHEFFIELD (1822–58). An American sculptor. He was born at Colchester, Conn., worked first as a bookbinder and a dentist, and studied a year in the Art Academy, New York. In 1845–48 he was curator of the Wadsworth Gallery, Hartford, Conn. When ready to go on farther with his studies, he found that he was color blind, and therefore he decided to devote himself to sculpture. On the point of his departure for Italy he was stricken with smallpox, his illness finally resulting in lameness for life. He later did go to Italy, and, with the exception of two visits to his native land, spent the remainder of his life there. His most important work, "Eve," together with his "Sappho" and "Genius of Connecticut," are in the Wadsworth Gallery, Hartford. Among his other works are "Ruth," "Naomi," "Morning Star" and "Evening Star," and "The Shepherd Boy of the Campagna." Bartholomew was a genuine artist, but was handicapped by inadequate training and continuous ill health.

**BARTHOLOMEW**, JOHN GEORGE (1860–1920). An English geographer and cartographer, born at Edinburgh, Scotland. He was educated at Edinburgh University, and in 1884 was one of the founders of the Royal Scottish Geographical Society. He introduced improvements in map making, especially notable being his layer system of contour coloring in topographical maps. His publications include: *Survey Atlas of Scotland* (1895–1912); *Citizen's Atlas* (1898–1912); *Survey Atlas of England and Wales* (1903); *Atlas of World's Commerce* (1907); *Handy Reference Atlas of the World* (8th ed., 1909); *Atlas of Zoogeography* (1911).

**BARTHOLOMEW**, MASSACRE OF SAINT (Fr. *La Saint-Barthélemy;* shorter for *La Nuit de Saint-Barthélemy*, the night of St. Bartholomew). The massacre of the Huguenots, perpetrated on Aug. 24–25, 1572, which grew out of the feud in France between the house of Guise and the Catholics, on the one hand, and the house of Condé and the Huguenots on the other. (See CATHARINE DE' MEDICI.) From the tower of the royal palace the signal was given for a carnival of blood which lasted for several weeks and extended throughout France. The mortality cannot be determined with even approximate accuracy, as the different estimates, varying from 2000 to 100,000, show. Coligny, sought out by Guise himself, was among the first to fall. The two young Huguenot princes, Condé and Henry of Navarre, are said to have ransomed their lives by denying their religion. It is not likely, however, that this would have saved them, had not Catharine perceived that their death would have reacted against her by demoralizing the party opposed to Guise and leaving him with unlimited power—a thing she had no intention of permitting. Guise, although he had been the chief instrument in carrying out the plot, was unwilling to assume the ignominy attached to it, and Catharine induced her son to acknowledge before the Parlement his sole responsibility for the deed. The real part which the King took is hard to determine. Very reluctant at first to give his consent, he later, it is said, took a fiendish delight in the proceedings; but, on the other hand, some would have it that he died with remorse for the massacre. But whatever the other factors may have been, Catharine's imperative will and his own natural weakness leave little room for doubt as to the actual responsibility. The Pope ordered a medal to be struck in commemoration of the event and sent Cardinal Orsini to convey in person his felicitations to the Queen Mother.

For further reference, consult: White, *Massacre of St. Bartholomew* (London, 1868); Baird, *History of the Rise of the Huguenots of France* (New York, 1879–83); Baumgarten, *Vor der Bartholomausnacht* (Strassburg, 1882); Lavisse, *Histoire de France*, vol. vi (Paris, 1904).

**BARTHOLOMEW**, SAINT (Gk. Βαρθολομαῖος, *Bartholomaios*, from Heb. *bar*, son + Tolmai). One of the Twelve Apostles, mentioned in each one of the four lists (Mark iii. 18; Matt. x. 3; Luke vi. 14; Acts i. 13) and generally identified with the Nathanael of the Fourth Gospel, on the ground that otherwise he would be the only disciple mentioned in the opening chapter of the latter Gospel who did not become an apostle, and the only one mentioned in its closing chapter who was not an apostle; while the close relationship shown in the first chapter to have existed between him and Philip would agree with the coupling of his name with Philip's in the lists of the Synoptists, by whom Nathanael is never mentioned, as Bartholomew is not by the Fourth Gospel. Bartholomew, which is a patronymic ('son of Tolmai'), would thus be a distinguishing name added to Nathanael, as Barjona ('son of Jona') was to Simon. In case, however, the identification be rejected, the name would be an independent proper name, like Barnabas. The traditions which assign him as a missionary to many countries and

make him to have suffered many martyrdoms are worthless. This disposes of the legend, which Eusebius repeats, that he preached the Gospel in "India" (properly Arabia) and left behind him there the Gospel of Matthew written in Hebrew—a story which has figured in the discussion of Papias' statement that Matthew wrote his Gospel in that language. (See MATTHEW, GOSPEL OF.) It was on his day in the Roman Calendar, August 24, that the massacre of the Huguenots in Paris took place in 1572. In the Syriac translation of Eusebius' History the name Tolmai (Bartholomew) is substituted for Matthias (I, xii. 3; II, i. 1; III, xxv. 6, xxix. 4), the apostle appointed by the Church in the place of Judas (Acts i. 23–26). In case this identification also be accepted, there would be in the final apostolic list two of the same name.

**BARTHOLOMEW BAYOU,** bī'o͞o. A river or bayou (q.v.) of the United States (Map: Arkansas, D 4). From its source in the southeastern part of Jefferson Co., Ark., it flows in a tortuous course southeast, then south, and, crossing into Louisiana, takes a southwesterly direction and empties into the Ouachita River in Ouachita Parish, La. It is about 275 miles long and is navigable for 200 miles.

**BARTHOLOMEW FAIR.** The great annual market, a relic of the Mediæval Ages, formerly held at West Smithfield, London. It dates from a charter of 1133 granted by Henry I to his jester, Rahere, who had turned monk and founded the priory of St. Bartholomew. The fair began annually on St. Bartholomew's Day (August 24, o.s.; September 3, N.S.), and lasted 14 days, but in 1691 was curtailed to four days and afterward to three days. It was abolished in 1855. Consult: Morley, *An Historical Account of Bartholomew Fair* (London, 1810); id., *Memoirs of Bartholomew Fair* (London, 1859).

**BARTHOLOMEW'S** (SAINT) **HOS'PITAL,** Smithfield, London. Originally it formed part of the priory of St. Bartholomew, founded in 1123 by Rahere, the King's minstrel, who was the first prior of the convent of Augustinian Canons, founded by him in Smithfield. At the dissolution of the religious houses it was founded anew by Henry VIII, and the endowment has been subsequently enlarged from various sources, public and private. St. Bartholomew's is one of the three great endowed hospitals of London, the other two being St. Thomas's and Guy's. The hospital contains 675 beds and affords relief to 150,000 patients annually. There is a medical school attached, in which about 400 students are gathered; and a convalescent home accommodating 75 patients.

**BARTHOU,** bär'to͞o', LOUIS (1862– ). A French statesman, born at Oloron-Sainte-Marie. He was educated at the Lycée de Pau. He early entered public life and occupied many important positions in the French government. He acted in several cabinets as Minister of Public Works, chief in the cabinet of the Ministry of the Interior, and Minister of the Interior. He was appointed Minister of Justice in the first cabinet organized by President Poincaré in 1913, under the premiership of Aristide Briand. On the fall of this ministry on March 18, 1913 (see FRANCE, *History*), he was appointed Premier and Minister of Public Instruction. This office he resigned in December of the same year. He published *L'action syndicalé* (1904) and *The Life of Mirabeau* (1913).

**BAR'TIZAN.** A small stone closet, thrown out upon corbels over doorways and on other parts of mediæval castles, generally for defense, but sometimes only for convenience to the inmates and defenders. The word, probably a Scotch corruption of *bratticing* or *bretticing*, was not used before Scott.

**BARTLESVILLE.** A city and the county-seat of Washington Co., Okla., about 125 miles (direct) from Oklahoma City, on the Atchison, Topeka, and Santa Fe and the Missouri, Kansas, and Texas railroads (Map: Oklahoma, F 1). It contains a Carnegie library, county courthouse, Elks Home, a fine city hall, and Silver Lake. Bartlesville is the centre of an important oil region known as the Mid-Continent Oil Field, which produces about 59,000 barrels a day. Washington County itself produces one-third of this amount. There are also zinc ore smelting interests and large deposits of natural gas. The commission form of government was adopted in 1919. Pop., 1900, 235; 1910, 6181; 1920, 14,417.

**BARTLET,** J(AMES) VERNON (1863– ). An English church historian, born at Scarborough. He was educated at Exeter College, Oxford, and after several years as fellow and lecturer he became professor of church history at Mansfield College, Oxford, in 1900. Besides his special contributions to reviews and works of reference, he is author of *Early Church History* (1894); *The Earlier Pauline Epistles* (1901); *The Apostolic Age* (1902); *Studies in the Synoptic Problem* (1911); *Evangelical Christianity* (1912).

**BARTLETT,** HOMER NEWTON (1845–1920). An American composer, organist, and teacher. He was born at Olive, N. Y., Dec. 28, 1845, and was one of the best known as well as most prolific of modern American musicians, his compositions and arrangements numbering nearly 200. He exhibited unusual precocity and in 1861 began his studies with S. B. Mills, Max Braun, Jacobson, and others. At the same time he commenced his career as a composer and subsequently held various positions in New York City and vicinity as organist, etc. Among his most popular compositions are a *concert polka* for pianoforte; an organ *toccata;* violin and orchestra *concerto;* tenor song, *L'amour;* and a cantata for chorus and orchestra, *The Last Chieftain.* He was particularly successful in his glees and part songs for men's and women's voices.

**BARTLETT,** JOHN (1820–1905). An American editor and publisher, born at Plymouth, Mass. He became senior member of the firm of Little, Brown & Co., Boston, in 1878. He compiled a well-known and valuable collection of quotations from poets and prose writers, entitled *Bartlett's Familiar Quotations* (1855), which has passed through many editions. He also published in 1894 an exhaustive concordance to Shakespeare.

**BARTLETT,** JOHN RUSSELL (1805–86). An American bibliographer, lexicographer, and ethnologist. He was born in Providence, R. I.; passed his early life at Kingston, Canada; became a banker in Providence, and later a bookseller in New York, and returned to Providence in 1850. From 1850 to 1853 he served on the commission appointed by President Taylor to fix the boundary between the United States and Mexico, in accordance with the Treaty of Guadaloupe-Hidalgo, and from 1855 to 1872 was Secretary of State for Rhode Island. He was a

voluminous writer, among his publications being *The Progress of Ethnology* (1847); *A Dictionary of Americanisms* (1848), which went into many editions and was long a standard book of reference; *A Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua* (2 vols., 1854); and *Memoirs of Rhode Island Officers in the War of the Rebellion* (1867). In addition he compiled a number of valuable works, chiefly bibliographical, including *Records of the Colony of Rhode Island and the Providence Plantations* (10 vols., 1856–65); *Bibliography of Rhode Island* (1864); *Literature of the Rebellion: A Catalogue of Books and Pamphlets Relating to the Civil War and to Slavery* (1867), and a four-volume *Catalogue of the John Carter Brown Library.*

**BARTLETT,** JOSIAH (1729–95). An American statesman, born at Amesbury, Mass. After but slight study he began medical practice at Kingston, N. H., in 1750, and in 1754 successfully introduced Peruvian bark in treatment of *angina maligna.* From 1765 to 1775 he was a member of the State Legislature. In this capacity he frequently criticised the Governor, and it was to check his influence that he received from the royal Governor, Sir John Wentworth, appointments as a magistrate and as commander of a militia regiment, but in 1775 was deprived of both in consequence of his Whig activities. A delegate in 1775 and 1776 to the Continental Congress, he was the first member to vote for the Declaration of Independence, and the first, after the President, to sign the document. He became chief justice of the New Hampshire court of common pleas in 1779, a judge of the State Supreme Court in 1784, and chief justice in 1788. From 1790 to 1793 he was President of New Hampshire, and in the latter year, under the new constitution, was elected Governor. He was the principal founder (1791) of the New Hampshire Medical Society.

**BARTLETT,** PAUL WAYLAND (1865–1925). An eminent American sculptor. He was born at New Haven, Conn., the son of Truman H. Bartlett, sculptor and art critic. At 15 he began the study of sculpture in Boston under Frémiet, and afterward he studied with Cavelier in the Ecole des Beaux-Arts. He was at first interested in animal sculpture, his best work of this period being the "Dying Lion." Other examples are in the Jardin des Plants, Paris. He received honorable mention at the Salon in 1887 for the "Bear Tamer," now in the Metropolitan Museum, New York. Among notable works of this sculptor are the "Ghost Dancer" (Pennsylvania Academy) and, in Fairmount Park, Philadelphia, an equestrian statue of General McClellan; the statue of Gen. Joseph Warren in Boston; the equestrian statue of Lafayette, presented by the school children of the United States to France, and now in the square of the Louvre, Paris; statues of Columbus and Michelangelo in the Congressional Library at Washington. Other works are in the public art collections of Philadelphia, Boston, and Chicago, and in the Luxembourg in Paris. Later productions than those already named include a door for the tomb of ex-Senator W. A. Clark in Woodlawn Cemetery, New York; a statue of Benjamin Franklin at Waterbury, Conn.; a marble group for the pediment of the House wing of the National Capitol, and six heroic figures for the central entrance of the New York Public Library. Upon the last two commissions the sculptor was in 1913 still engaged. Bartlett's work for the most part represents a preference for the specific rather than the symbolic in sculpture. His highly modern technique is essentially French in character. He was chosen a corresponding member of the Institut de France and an officer of the Legion of Honor (1908). In 1913 he was appointed director of sculpture in the Glasgow School of Fine Arts.

**BARTLETT,** ROBERT ABRAM (1875– ). An American explorer, born at Brigus, Conception Bay, Newfoundland, and educated at the Methodist College at St. John's and at the Halifax Nautical Academy. A qualified master of British ships, he accompanied Robert E. Peary on an Arctic expedition in 1897–98 and in 1905–09 commanded the *Roosevelt* in the voyages leading up to Peary's discovery of the North Pole. On the final dash he accompanied Peary on land as far north as the 88th parallel. Bartlett became a naturalized American citizen in 1911. Early in the summer of 1913 he sailed with the Stefansson Arctic expedition, in command of the Canadian vessel *Karluk;* the object of the expedition was to explore the regions bordering on the North Pole and to define the limits of the new continent believed to exist there. In December of the same year Arctic mariners returned to Seattle with the news that Bartlett's ship had been carried far out into the Arctic Ocean during September and had not since been heard from.

**BARTLETT,** SAMUEL COLCORD (1817–98). An American clergyman and educator, born at Salisbury, N. H. He graduated at Dartmouth College in 1836 and at Andover Theological Seminary in 1842; was ordained to the ministry in 1843, and for the next three years was pastor of the Congregational Church of Monson, Mass. He was professor of intellectual philosophy at Western Reserve College (1846–52); pastor of the Franklin Street Congregational Church, Manchester, N. H. (1852–57) and of the New England Church, Chicago (1857–58); and was professor of biblical literature in the Chicago Theological Seminary (1858–77). From 1877 to 1892 he was president of Dartmouth College, which during his administration was greatly expanded as to curriculum, buildings, and funds. He received the degree of D.D. from Dartmouth and that of LL.D. from Dartmouth and Princeton. A distinguished biblical scholar, he published, in addition to contributions to the *Bibliotheca Sacra,* the *Princeton Review,* and other periodicals: *Life and Death Eternal* (1866); *From Egypt to Palestine* (1879); *Sources of History in the Pentateuch* (1883); *The Veracity of the Hexateuch* (1897).

**BARTLETT,** WILLARD (1846–1925). An American jurist, born at Uxbridge, Mass. He received his education at New York and Columbia universities. He practiced law from 1869 to 1883, during part of this time acting also as dramatic critic of the New York *Sun,* was a justice of the Supreme Court of New York in the Second Judicial District from 1884 to 1906, and in the latter year became associate judge of the court of appeals. He was appointed professor of medical jurisprudence at the Long Island College Hospital in 1898. In 1913 he was elected chief judge of the court of appeals of New York State.

**BARTLETT,** WILLIAM FRANCIS (1840–76). An American soldier. He was born at Haverhill,

Mass., and studied at Harvard for three years, but left college in 1861 to join the Federal army. He received a captain's commission in August, served in the battle of Ball's Bluff, and at the siege of Yorktown received a wound which necessitated the amputation of his leg. By the spring of 1862 he had recovered sufficiently to graduate with his class at Harvard. He organized the Forty-ninth Massachusetts Volunteers in September, 1862, and served as colonel in General Banks's Louisiana expedition. He was wounded at Port Hudson and again in the Wilderness campaign, was taken prisoner at the explosion of the Petersburg mine, was confined for a time in Libby Prison, and after his release was placed in command of the First Division of the Ninth Army Corps. In June, 1864, he was raised to the rank of brigadier general of volunteers, and in March, 1865, was brevetted major general of volunteers for "gallant and meritorious services during the war." As a soldier he was noted for his intrepidity, coolness, and daring in action. After the war, until the time of his death, he was engaged in business in Richmond, Va., and Pittsfield, Mass. Consult Palfrey, *Memoir of William Francis Bartlett* (Boston, 1878).

**BARTLETT,** William Henry (1809–54). An English topographical draughtsman. He was born in London, and began his career as an assistant to John Britton, the architect, for whose *Cathedral Antiquities of England* (1814–32) he furnished numerous sketches. A series of volumes, containing more than 1000 of his drawings made during extended travel in Europe and the Orient, were published by Dr. Beattie, his companion on several of these voyages, and others. Between the years 1836 and 1852 Bartlett made four voyages to the United States and Canada, the fruits of which appeared in *American Scenery* (1840), and *Canadian Scenery* (1842), with text by N. P. Willis. Besides his frequent contributions to works of art, he published the well-known books: *Walks about Jerusalem* (1844); *Forty Days in the Desert* (1848); *The Nile Boat: or Glimpses of Egypt* (1849); *Footsteps of Our Lord and His Apostles in Syria, Greece, and Italy* (1851); *The Pilgrim Fathers* (1853); *Jerusalem Revisited* (1855).

**BARTLETT,** William Holmes Chambers (1809–93). An American soldier and scientist, born in Lancaster Co., Pa., and educated at West Point, where he graduated in 1826. Being assigned to the engineers, he served as assistant professor at West Point from 1827 to 1829, and again from 1834 to 1836 as acting professor of natural and experimental philosophy. From 1828 to 1832 he was engaged in construction work at Fort Monroe, and from 1832 to 1834 was assistant to the chief engineer at Washington, D. C. In 1836 he resigned his lieutenancy in the army and became full professor of natural philosophy at West Point, which office he held until he retired from active service in 1871. He was an original member of the National Academy of Sciences. His works include: *Treatise on Optics* (1839); *Synthetical Mechanics* (1850–58); *Acoustics and Optics* (1825–59); *Analytical Mechanics* (1853–59); *Spherical Astronomy* (1855–58).

**BARTOL,** Cyrus Augustus (1813–1900). A Unitarian minister, born at Freeport, Me. He graduated at Bowdoin College, 1832, and at the Cambridge Divinity School, 1835, and from 1837, for 50 years, was a pastor in Boston. His works include *Radical Problems* (1872), *The Rising Faith* (1875), and *Principles and Portraits* (1880).

**BARTOLI,** bär'tō-lē, Adolfo (1833–94). An Italian scholar, born at Fivizzano. He at first studied law, but afterward became associate editor of the *Archivio storico italiano* (1856–59), principal of the gymnasium in Alessandria, director of the naval academies at Leghorn, principal of *licei* at Piacenza and Venice, and professor at the *Instituto degli studi superiori* at Florence (1874). While at Venice he was one of the founders of the periodical *Archivio Veneto* (1871– ) and fostered the project of publishing the monumental *Diaries* of Marin Sanudo. Besides his valuable editions of the earlier Italian authors he published several original works, among which may be mentioned: *I viaggi di Marco Polo* (1859); *I primi due secoli della letteratura italiana* (1870–80); *I precursori del Boccaccio* (1876); *Storia della letteratura italiana,* vols. i–viii (1878–89), and *Scenari inediti della commedia dell' arte* (1880), all pioneer works in the modern school of historical criticism.

**BARTOLI,** Daniello (1608–85). A learned Italian Jesuit. He was born at Ferrara and died at Rome. He was for many years rector of the Jesuit College at Rome, but is best known as author of an *Istoria dell Compagnia di Gesù* ('History of the Jesuits'), vols. i–iii covering the history of the order in Africa, China, and other parts of the East, and vols. iv–v, England and Italy. He also wrote numerous biographies, books on religion and morals, and on physical phenomena. His works have no longer any scientific or historical value, but they are highly interesting in style, wherein he is often compared with D'Annunzio. His book, *Il torto e il diritto del non si può,* is a distinct contribution to the theory of æsthetics. Consult Trabalza, *Storia della gramatica italiana* (Padova, 1907, chap. xi), Morandi, *Antologia della critica,* p. 627 (Città di Castello, 1895), and Boero, *Lettere edite ed inedite di D. B.* (Bologna, 1865). His complete works appeared at Turin (34 vols., 1823–44).

**BARTOLINI,** bär'tō-lē'nē, Lorenzo (1777–1850). An Italian sculptor. He was born at Vernio, near Savigniana (Tuscany), the son of a smith. He labored at Florence as alabaster carver and went as such to Paris, where he studied under Lemot. With a bas-relief of "Cleobis and Biton" he obtained a prize at the Institute, which brought him commissions for a relief for the Vendôme Column and a bust of Napoleon for the Institute. In 1808 the Emperor sent him to Carrara to establish there a school of sculpture. Bartolini was, after Canova, the most celebrated of Italian sculptors of the Napoleonic era. After his patron's fall he was appointed professor of sculpture in the Florentine Academy. Although his work had hitherto been in the classical style of the First Empire, he now sought to reform this by the application of the realistic principles of the fifteenth-century Florentines. Their influence is evident in his later works, which thus form a transition from classicism to modern realism. Among the principal are the statues of "Charity," in the Pitti Palace, Macchiavelli in the portico of the Uffizi, and three important tombs in Santa Croce, Florence; "Neoptolemus Casting Astyanax from the Walls of Troy," the masterpiece of his classic period, and "Faith," often reproduced, now in the Poldi Pezzoli Museum,

Milan; two colossal statues of Napoleon, now at Bastia (Corsica) and in the United States, and many busts, including those of his friend Ingrès, Madame de Staël, Byron, Rossini, Cherubini, and Thiers.

**BARTOLOMMEO,** bär'tō-lŏm-mā'ō, FRA (1472–1517). One of the principal painters of the Florentine Renaissance. The son of a mule driver from Genoa, he was born, March 14, 1472, near the gate of San Piero Gattolino, whence before becoming a friar, he was called Baccio (Bartolommeo) della Porta ('gate'). On the advice of Benedetto da Majano, who discovered his precious talent, he was placed in the atelier of Cosimo Roselli. There he came into contact with Piero di Cosimo, who, according to Berenson, was his master, and formed his lifelong friendship with Albertinelli (q.v.). With all the fervor of a pious nature he embraced the cause of Savonarola; of this devotion the well-known portrait of the reformer, long cherished by the brethren of San Marco, but now in the Academy, bears eloquent testimony. At the celebrated "Burning of Vanities" ordered by the Prophet, he destroyed all his pictures not of a strictly religious character. To the same period belongs his fresco of the "Last Judgment" (in Santa Maria Nuova, finished by Albertinelli, now in the Uffizi), when Bartolommeo entered the cloister. For after Savonarola's death he renounced painting and in 1500 joined the Dominicans at San Marco. Yielding to the persuasion of his prior, the learned Sante Pagnani, he took up the brush again in 1504, and created the beautiful "Apparition of the Virgin to St. Bernard" (Florentine Academy). He was much influenced by the works of Leonardo and by the young Raphael, whom he, in turn, influenced to a still greater degree. A visit to Venice in 1508 was epoch making for his art. The influence of Bellini and Giorgione transformed him into one of the chief colorists of the Florentine school. From 1509 to 1512 he was again associated with Albertinelli; among their joint works are the "Madonna and Saints" in the Pitti and the "Assumption" in Berlin, but the fine "Marriage of St. Catharine" in the Louvre is by Bartolommeo alone. On a brief visit to Rome (1514) his art was transformed by the Sistine frescoes of Michelangelo, whose colossal forms he thenceforth imitated. Like his friend Albertinelli, he was stricken with malaria, to which he finally succumbed at Pian di Mugnone, a convent house of the Dominican Order, Oct. 31, 1517. After his return to Florence occurred the well-known episode of his "St. Sebastian," the nudity of which proved so disturbing to the good brethren of San Marco as to cause its removal; it is now in private possession at Pézenas. The art of Fra Bartolommeo's early period may be best studied in his admirable drawings, of which a great number survive in the collection of prints of the Uffizi, the Louvre, Munich, British Museum, and that of Weimar. They show infinite diligence and a very remarkable talent for composition. Paintings of the early period are scarce; but an excellent example is the fresco of "Christ at Emmaus" (1507) in San Marco. The period following his visit to Venice is that of his finest paintings. Among the best are: "Madonna with Saints John and Stephen" (1509), and "Saints Mary Magdalen and Catherine Adoring God" (1509), both in the cathedral of Lucca; the "Madonna with Six Saints" (1509) in San Marco, Florence; the "Betrothal of St. Catherine" (1511) in the Louvre, and another in the Pitti Palace, both showing the influence of Leonardo in composition. Under the influence of Michelangelo his color deteriorated and the figures became empty of their former spiritual content; although the best are still masterpieces. They include the "Madonna della Misericordia" (1515) at Lucca, the well-known "St. Mark" (1517), "Salvator Mundi" (1514), and "Pietà," all in the Pitti Palace. He was the first to portray with highest excellence that majestic combination of character, form, and strict architectural composition so characteristic of the High Renaissance. He excelled especially in draperies and was among the first to use the lay figure, which he is said to have invented. He was one of the greatest masters of composition Italy ever produced. Although the color in his paintings has suffered much through his use of dark shadows, it is rich and delicate and belongs to the very best achieved by Florentine painters. Consult the biographies by Frantz (Regensburg, 1879), Scott (London, 1881), Gruyer (Paris, 1886), and Knapp (Halle, 1903).

**BARTOLOZZI,** bär'tō-lōt'sē, FRANCESCO (1727–1815). An Italian engraver, who practiced chiefly in England. He was born at Florence, the son of a goldsmith, and studied at the Florentine Academy, excelling especially in drawing and anatomy. Among his fellow pupils was his lifelong friend and future associate Giovanni Battista Cipriani (q.v.). After studying the antique at Rome he was apprenticed for six years to the engraver Wagner at Venice. He then practiced at Rome, engraving Domenichino's "Life of St. Nilus" and other seventeenth-century masters, and more successfully at Venice, where he formed a brilliant style well adapted to the rendition of seventeenth-century Venetian masters, especially Tiepolo. In 1764, on the invitation of Dalton, librarian to George III, he removed to London, where he was welcomed by Cipriani. He was appointed engraver to the King and was one of the original members of the Royal Academy in 1768. In Dalton's employ he completed a fine series of etchings of Guercino's drawings, probably his best etched work. He is especially known for his prolific work in the "red chalk manner of engraving," so called because of its resemblance to red chalk drawings, but in reality a kind of stippling (q.v.). Although he did not, as reputed, invent this process, he greatly improved it and made it so popular that it almost replaced other varieties of engraving in Great Britain. In this manner he reproduced many paintings, mostly classical subjects by Angelica Kauffmann and his friend Cipriani, and also engraved his celebrated *Imitations of the Original Drawings by Hans Holbein in the Collection of His Majesty*, 1792, which were tinted as well as stippled. Of greater importance are his line engravings, such as "Clytie," after Annibale Carracci, Carlo Dolci's "Mater Dolorosa," and a number of plates for Boydell's Shakespeare. In 1802 Bartolozzi was made head of the Royal Academy at Lisbon, where he remained in charge of the school of engraving until his death. He was an artist of great facility and diligence, but his work was often superficial, owing to its great volume and the frequent assistance of pupils. But in his best work he is an engraver of high order, whose prints are still much prized. He formed a large and important school in London, which continued his work after his departure. Con-

sult Tuer, *Bartolozzi and his Works* (London, 1882); Brinton, *Bartolozzi and his Pupils in England* (ib., 1904); "Bartolozzi and Other Stipple Engravers" in *Great Engravers Series* (ib., 1906); Bailly, *Bartolozzi* (ib., 1907).

**BAR'TOLUS,** Osso, or **BARTOLUS A SAXOFERRATO** (1314–57). A celebrated Italian jurist, professor of civil law in the University of Perugia, and the most famous master of the dialectical school of jurists, the Postglossators, also called, after him, the Bartolists. His influence on the progress of legal science was considerable, and he won great reputation by his lectures and writings; among the latter are treatises *On Procedure* and *On Evidence* and a *Commentary on the Code of Justinian* (1588–89). His magnificent monument in the church of San Francisco at Perugia bears simply his name. His complete works were published in 1596. Consult John Neville Figgis, *Bartolus and the Development of European Political Ideas* (London, 1905).

**BARTON,** bär'ton, Andrew (?–1511). A Scottish naval commander, who in 1506 completely cleared the coast of Scotland of the Flemish pirates who had infested it. He is said, on this occasion, to have packed the heads of the slain in three barrels, which he sent to King James in evidence of the effectual manner with which he had executed his task. In 1508 he was sent to the assistance of Denmark in the war with Lübeck, but somewhat later was accused of piracy, and after a desperate naval battle was killed in an encounter with Sir Thomas and Sir Edward Howard, who had been sent out by Henry VIII to capture him. His ship, *The Lion*, was brought as a trophy to the Thames, and became the second man-of-war in the English navy; the first vessel of this kind to be constructed having been the *Great Harry* (1504). The defeat of the celebrated mariner is commemorated in the old ballad of "Sir Andrew Barton."

**BARTON,** Benjamin Smith (1766–1815). An American naturalist. He was born at Lancaster, Pa.; studied at Philadelphia, London, Edinburgh, and Göttingen, and was professor of natural history, botany, and materia medica in Philadelphia College, now the University of Pennsylvania. Besides many papers in the philosophical and medical journals, he published *Observation on Some Parts of Natural History* (1787), *New Views of the Origin of the Tribes of America* (1797), *Elements of Botany* (1803), *Collections toward a Materia Medica of the United States* (1819), and other medical works.

**BARTON,** Bernard (1784–1849). An English poet, sometimes called "the Quaker Poet." He was born at Carlisle, Jan. 31, 1784. In 1810 he became clerk to a banking house at Woodbridge, where he remained till his death. His first volume of verse, *Metrical Effusions* (1812), brought him into correspondence with Southey. *Poems by an Amateur* (1818) and *Poems* (1820) increased his reputation and gained him the friendship of Lamb. *Napoleon and Other Poems* appeared in 1822 and was followed within five years by several other productions. All the poems of Barton are pervaded by pious sentiment, and some passages display much natural tenderness and religious fervor; but he is, on the whole, rather a fluent, pleasant versifier than a poet. Some years before his death he received, through Sir Robert Peel, what was at that time regarded in England as a large pension, of £100. Among his later works are *Fisher's Juvenile Scrap-book* (1836 ff.), *The Reliquary* (1836), and *Household Verses* (1845). He died Feb. 19, 1849. Consult Barton, *Poems and Letters*, ed. L. Barton, with a memoir by E. FitzGerald (London, 1849), and Lucas, *Bernard Barton and his Friends* (London, 1894).

**BARTON,** Clara (1821–1912). An American philanthropist. She was born at Oxford, Mass., was a teacher in early life, and the founder of various free schools in New Jersey. In 1854 she had a clerkship in Washington, but resigned at the beginning of the Civil War and went into hospital service. After the war she originated and carried on, at her own cost, a systematic search for missing soldiers. Going to Europe, she assisted in establishing hopitals in the Franco-German War, followed the German army, and was honored with the Gold Cross of Baden and the Iron Cross of Germany. By her efforts the American Red Cross Society was formed, 1881, and she was its president until 1904. In 1905 she became president of the National First Aid Association. In 1883 she was appointed superintendent and steward of the reformatory prison for women at Sherborn, Mass. In 1884 she represented the United States at the Red Cross Conference and at the International Peace Convention in Geneva. It was her suggestion that led to a change of the rules of the Red Cross Society permitting relief in other calamities than that of war. She superintended relief work in the yellow fever pestilence in Florida (1887), the Johnstown flood (1889), the Russian famine (1891), among the Armenians (1896), in the Spanish-American War (1898), and in the Anglo-Boer War (1899–1902). The last work of which she took personal direction was the relief of sufferers from the flood at Galveston in 1900. She wrote a *History of the Red Cross* (1883), *History of the Red Cross in Peace and War* (1898), *Story of the Red Cross* (1904), *Story of my Childhood* (1907). Consult Adams and Foster, "Clara Barton," in *Heroines of Modern Progress* (1913).

**BARTON,** Sir Edmund (1849–1920). An Australian statesman. He was born at Glebe, a suburb of Sydney, New South Wales, studied law, and was called to the bar in 1871. He was long a leading figure in the legislative council and assembly and was Speaker and Attorney-General. He was a member of the Federal Convention of 1891 and was senior representative for New South Wales at the Convention of 1897–98. Upon the creation of the Australian Commonwealth, for which he had ardently labored, he became Prime Minister and Minister for Foreign Affairs in the first Federal cabinet (1901), retiring in 1903 to become a member of the Federal High Court.

**BARTON,** Elizabeth (1500?–34). An English impostor, commonly known as the "Holy Maid," or "Nun of Kent." She was born, according to her statement, in 1506. About 1525 she was employed as a tavern servant at Aldington, where she developed religious mania after a severe nervous illness. In prolonged trances she "told wondrously things done in other places, whilst she was neither herself present nor yet heard no report thereof." The fame of these revelations spread, and Archbishop Warham sent two monks to examine her. One of these, Edward Bocking, or Bockling, saw in her abnormal faculties an opportunity for increasing the pres-

tige of the Roman Catholic religion. He influenced and instructed her, and by assumed "prophecies" she deceived persons of all ranks and men of intellect. In 1527 she became a nun at Canterbury and in 1532 inveighed against Henry VIII's intention to divorce Queen Catharine, predicting his death within a month of his remarriage. This excited the King's wrath, and she lost popular confidence by the non-fulfillment of her prophecy. She was arrested and ultimately confessed that her visions and sayings were "feigned of her own imagination only, to satisfy the minds of those which resorted to her and to obtain worldly praise." With Bocking she was executed at Tyburn, April 20, 1534. Consult Froude, *History of England.*

**BARTON,** GEORGE AARON (1859– ). An American clergyman and Orientalist, born at East Farnham, province of Quebec. He was educated at Haverford College and Harvard University. He became a minister of the Society of Friends in 1879, professor of Biblical literature and Semitic languages at Bryn Mawr College in 1891, and in 1902 director of the American School for Oriental Study and Research in Palestine. Among his publications are: *A Sketch of Semitic Origins, Social and Religious* (1902); *The Haverford Library Collection of Cuneiform Tablets, or Documents from the Temple Archives of Telloh* (2 parts, 1905–09); *The Heart of the Christian Message* (1910; new ed. revised, 1912); "Commentary on Job" in the *Bible for the Home and School* (1911).

**BARTON,** WILLIAM (1748–1831). An American soldier, born in Rhode Island. On the night of July 9, 1777, he led a small party across Narragansett Bay, eluded three British war vessels, and near Newport captured the English General Prescott. For this act Congress gave him a sword and a colonel's commission.

**BARTON,** WILLIAM ELEAZAR (1861– ). An American clergyman and writer, born at Sublette, Ill. He graduated from Berea College in 1885, and from Oberlin Theological Seminary in 1890. Ordained to the Congregational ministry, he first filled several pastorates in Ohio and Tennessee, then served the Shawmut Congregational Church of Boston in 1893–99, and afterward the First Church of Oak Park, Ill. The Chicago Theological Seminary appointed him in 1905 lecturer on applied practical theology, and in 1911 lecturer on ecclesiastical law. He was also associate editor of *Bibliotheca Sacra,* editor of the pastor's department of *The Advance,* and a member of *The Youth's Companion* staff. A full list of his books would comprise over 40 titles. Among these are: *Life in the Hills of Kentucky* (1889); *A Hero in Homespun* (1897); *The Psalms and their Story* (1898); *The Old World in the New Century* (1902); *Jesus, His Life and the Scenes of His Ministry* (1904); *The History and the Religion of the Samaritans* (1906); *Bible Classics* (1911); *The Young Folks' Bible Library* (editor, 8 vols., 1911); *Day by Day with Jesus* (1913).

**BARTON,** WILLIAM PAUL CRILLON (1786–1856). An American botanist. He was born in Pennsylvania, graduated at Princeton in 1805, and received the degree of M.D. from the University of Pennsylvania (1808). He organized the United States naval bureau of medicine and surgery, succeeded his uncle as professor of botany in the University of Pennsylvania, was for several years professor of materia medica and botany in Jefferson Medical College, and at his death was senior surgeon of the navy. He published *Vegetable Materia Medica of the United States* (1817–25); *Compendium Floræ Philadelphiæ* (2 vols., 1818); *Flora of North America* (3 vols., 1821–23).

**BARTOW,** bär'tō. A city and the county-seat of Polk Co., Fla., 43 miles by rail east of Tampa, on the Atlantic Coast Line and the Seaboard Air Line railroads (Map: Florida, E 4). It is the seat of the Summerlin Institute, and contains a Carnegie library, county jail, opera house, and a fine county courthouse. The leading industries are phosphate production and fruit cultivation, and there are marble works, a planing and shingle mill, cigar, wagon, and concrete factories, and bottling works. The electric light plant and water works are owned by the city. Pop., 1890, 1386; 1900, 1983; 1910, 2662.

**BARTRAM,** JOHN (1699–1777). The first American botanist of eminence. He was born of Quaker parentage, near Darby, Pa. He secured an appointment as American botanist to George III, and Linnæus, with whom he corresponded, pronounced him "the greatest natural botanist in the world." For many years he carried on an extensive correspondence with the most eminent of European naturalists, to whom he sent large plant collections in exchange for books, and at his home near Philadelphia he received as his guests many foreigners attracted thither by his reputation for learning and hospitality. In 1728 he established at Kingsessing, on the Schuylkill, the first botanical garden in America. In addition to several papers which he contributed to the *Transactions of the Philosophical Society,* he wrote a small but very interesting book, entitled *Observations on the Inhabitants, Soil, Divers Productions, Animals, etc., Made by John Bartram in His Travels from Pennsylvania to Onondaga, Oswego, and the Lake Ontario* (1751). His *Journal Kept Upon a Journey from Saint Augustine up the Saint Johns* was published in William Stork's *Description of East Florida* (1769). Consult William Darlington, *Memorials of John Bartram and Humphrey Marshall* (Philadelphia, 1849).

**BARTRAM,** WILLIAM (1739–1823). An American botanist and ornithologist. Son of John Bartram. He was born at Kingsessing, Pa., Feb. 9, 1739, and died there, July 22, 1823. He prepared the most complete list of American birds before Alexander Wilson and wrote *Travels through North and South Carolina, Georgia, and East and West Florida* (Philadelphia, 1791).

**BARTSCH,** bärtsh, ADAM VON (1757–1821). An eminent Austrian engraver and writer on art. He was born in Vienna, where he studied engraving under Schmutzer and was appointed custodian of the Imperial collection of engravings. He practiced both as an engraver and an etcher and produced 505 plates, partly of his own invention, partly after the original designs of famous masters. His chief title to fame consists in the authorship of *Le Peintre-graveur* (21 vols., 1802–21; new ed., 1866–70), a critical catalogue of engravings of still undisputed authority. In this work he laid the foundations of the modern science of engraving. Of great importance also are the reproductions of Dürer's engravings, executed by him and under his direction and published at Vienna (1796–99).

**BARTSCH,** KARL FRIEDRICH ADOLF KONRAD (1832–88). A German philologist. He was born at Sprottau, Silesia, Feb. 25, 1832. From 1858 to 1871 he was professor at Rostock, where he established the first Germanic Seminary in Germany. From 1871 until his death he was head of the department of German and Romance philology at the University of Heidelberg. In 1868 he succeeded Pfeiffer as editor of *Germania*. As a scholar, Bartsch was distinguished by versatility and industry. His attention was divided between Middle High German and Provençal poetry, in both of which he edited numerous texts, accompanied by exhaustive investigations of metre, literary relations, etc. Probably his most important single contribution is his study of the Nibelungenlied (1865), which was followed by several editions of the poem and a translation into modern German (1867). His study of the early literatures of Germany and France enabled him to discover many important connections between the two. Among his many other works may be mentioned introductions to the study of Old French and Provençal; *The Song of Roland* (1874); a translation of Burns (1865), of Dante's *Divine Comedy* (1867), and of old French folk songs (1882). Bartsch's latest work was the preparation of a catalogue of the Old German MSS. of the University Library in Heidelberg (1886). Bartsch was an original poet as well as a scholar and in 1874 published a volume of lyrics. While much of his work is now antiquated, he will always be remembered as one of the most brilliant scholars and teachers that Germany has ever possessed. For biography, bibliography, and criticism, consult *Germania*, vol. xxxiii (1888).

**BARTTELOT,** bär'tlō', EDMUND MUSGRAVE (1859–88). An English officer. He served in the Indian army and participated in the Afghan campaign and afterward received an appointment as major in the Egyptian army, in which capacity he joined the Stanley Expedition of 1887 for the relief of Emin Pasha. On June 11, 1888, after vainly waiting for the carriers promised by Tippoo Tib and notwithstanding the sickness and famine in his camp, Barttelot began his journey into the interior. In a mutiny among his followers, within a week of his departure, he was shot by one of his men. The accusation of barbarous cruelty, afterward brought against him by Stanley, was refuted by Barttelot's brother, Maj. Walter G. B. Barttelot, in the volume entitled *The Life of Edmund Musgrave Barttelot* (London, 1890).

**BARU,** bä-rōō' (Malay). See GOMUTI.

**BARUCH,** bā'rŭk (Heb. the blessed; cf. *Benedict*). The son of Neriah, and member of an illustrious family (cf. Jer. li. 59). He was the person to whom the prophet Jeremiah dictated some of his oracles (Jer. xxxvi. 4 seq.), and who also read Jeremiah's prophecies before the people who were present in the chamber of Gemariah in the Temple (ib., xxxvi. 10). During the siege of Jerusalem by Nebuchadnezzar, both he and the prophet were by their own countrymen imprisoned on suspicion of aiding the Chaldæans (Jer. xxxvii. 13; xliii. 3; Josephus, *Ant.* x, 9, 1), but obtained from the conqueror freedom and permission to choose their own residence. Baruch remained for some time in Palestine; but when the people, in spite of Jeremiah's remonstrances, went down to Egypt, the prophet, as well as Baruch, accompanied them (Jer. xliii. 6; Josephus, *Ant.* x, 9, 6). His subsequent history is unknown.

**BARUCH, BOOKS OF.** There are several works claiming to come from the pen of Jeremiah's secretary, mentioned in Jer. xxxvi. 4 ff.; xlv. 1. The most important among them are:

1. *The Book of Baruch*, which has a place in the Greek Bible between Jeremiah and Lamentations. This is one of the deutero-canonical books counted by the Protestants and the Greek Orthodox church in Russia as apocryphal. Besides the Greek text found in Codd. Vaticanus, Alexandrinus, Marchalianus, Venetus, and at least 20 minuscles, we possess Syriac, Old Latin, Coptic, Ethiopic, Arabic, and Armenian versions. The original was written in Hebrew. Origen supplied it throughout with asterisks and obeli according to the Hexaplaric Syriac. (See BIBLE.) Codex Ambrosianus of the Syriac text has in some places the remark "This is not in the Hebrew" (i. 17; ii. 3). After an introduction (i. 114) describing the origin and purpose of the book, the first part (i. 19–iii. 8) consists of a confession of the sins of the people which led to the captivity and a prayer for the restoration of national independence; the second part (iii. 9–iv. 4) contains a eulogy of wisdom, synonymous with the law, in the style of Proverbs viii and the later "wisdom" literature; and the third part (iv. 5–v. 9) offers consolation to the exiles. Some scholars hold that these sections come from different hands, but there is not enough evidence to make the documentary analysis convincing. According to i. 2 Baruch wrote the book in the fifth year, by which probably 581 B.C. is meant, the fifth year from the capture of Jerusalem by Naburzaradan. An appendix to the Book of Jeremiah, drawn apparently from an old and reliable source, informs us (Jer. lii. 30) that there was a second deportation of exiles in 581. This seems to be the occasion the author of the Book of Baruch has in mind. He assumes that the final destruction of Jerusalem took place then, and that Baruch was carried away to Babylon, where he read the words of the book to Jehoiakim and the nobles, with the effect that a collection was taken and sent to Joachim, the high priest, together with the temple vessels that were returned, and a counsel to the people of Jerusalem to offer sacrifices on the altar there and to pray for Nebuchadnezzar and his son. But this exhortation to pray "for the life of Nebuchadnezzar and for the life of his son Balthasar" (i. 12) clearly shows that Baruch cannot have written the book. Balthasar is the Aramaic form of Belshazzar (Dan. v. 1), who is undoubtedly identical with Bilsharusur, the son of Nabuna'id, the last native King of Babylon, and not of Nebuchadnezzar. (See BELSHAZZAR.) Baruch would also have written this king's name Nebuchadrezzar, and not Nebuchadnezzar, as was done in later times. The influence of the Book of Daniel, or at least the legend which meets us for the first time in this book, written in 165 B.C., is manifest, as is that of Isaiah xl.–lv. and Job (see ISAIAH and JOB). If a date subsequent to 165 B.C. is therefore probable, it is not necessary to suppose that Baruch iv., v. are quotations from the Psalter of Solomon (c.48 B.C.), as the Psalmist may have quoted Baruch. Many scholars maintain that the reference to Nebuchadnezzar and Balthasar is an evidence that the author had in mind Vespasian and his son Titus and would place the composition of the book after 70 A.D.

But if it is assumed that the author reflects upon the historic situation at his own time and counsels exiled Jews to send gifts to Jerusalem, to offer sacrifices upon the altar there, and to pray for the Roman emperors, it is difficult to render such advice plausible in the circumstances following the fall of the city in 70 A.D. It seems more probable that he lived in the second century B.C., and simply placed himself back, with more or less success, into the historic situation of Baruch, expressing the feelings that would be natural to him. Consult Reusch, *Erklärung des Buches Baruch* (1853); Ewald, *Die Propheten des alten Bundes* (1868); Kneucker, *Das Buch Baruch* (1879); Gifford, in *Speaker's Commentary* (1888); Cornely, *Introductio in V. T. Sacros libros*, ii. 2 (1897); Marshall, in Hastings, *Dictionary of the Bible* (1898); Bevan, in Cheyne's *Encyclopædia Biblica* (1890); Rothstein, in Kautzsch, *Pseudepigraphen d. A. T.* (1900); Toy, in *The Jewish Encyclopædia* (1902); Schneedorfer, *Das Buch Jeremias, des Propheten Klagelieder, und das Buch Baruch* (1903); Whitehouse, in Charles, *Apocrypha and Pseudepigrapha of the Old Testament*, vol. i (1913).

2. *The Syriac Apocalypse of Baruch.* An apocryphal book extant as a whole only in a Syriac text. Chapters lxxviii–lxxxvi were already printed in the Paris Polyglot (1629–45); the rest of the work was not known until Ceriani published a Latin translation in 1866, and then the Syriac text in Codex Ambrosianus in 1871, and, in photolithographic reproduction, in 1883. A fragment of the Greek version was published by Grenfell and Hunt in *The Oxyrhynchus Papyri*, iii. (1903). It was probably written originally in Hebrew, as Charles and Wellhausen have shown, and then translated into Greek, from which our Syriac text is a version. The book claims to contain revelations that came to Baruch in the twenty-fifth year of Jeconiah, by which this king's lifetime is evidently meant, consequently in 589, and also after the destruction of the city. Baruch, however, cannot have written this book; for the author is aware of a later destruction of Zion (xxxii. 3), forgets that Baruch was still in the land (lxxxv. 2 f.), is familiar with the doctrines of a heavenly Jerusalem (iv. 2 ff.), a Gehenna (lxxxv. 13), a Messiah (xxix. 3; xxx. 1 ff.; xxxix. 7; lxxii. 2), and a resurrection from the dead (xlix.–li.), and reveals in other ways that he lived in a later time. His doctrinal attitude is that of the Pharisaic party, and salvation through obedience to the law is strongly emphasized; but there is no evidence of acquaintance with the teachings of Paul or conscious polemics against them. The author seems to be familiar with Daniel and Enoch i.–xxxvi., but it cannot be shown that he had before him the Apocalypse of Ezra. (See EZRA, BOOKS OF.) He probably wrote between 70 and 90 A.D. Kabisch, De Faye, and Charles have been struck with the sad tone that prevails in some sections and the cheerful look into the future that characterizes others and have assigned these to different authors. Charles has also noticed the absence of references to the Messiah, the resurrection, or the restoration of Israel, where he would expect it, and has suggested that there were at least seven authors living at different times before and after 70 A.D. whose works were drawn upon in the compilation of this apocalypse. These arguments, however, do not appear valid to all scholars. That an author living after the terrible experience of 70 A.D., writing in the name of one who had seen the destruction of Jerusalem in 586 B.C., should lament, sing elegies and look with anxiety for the signs of the time, is not extraordinary and is not to be ascribed to pessimism; nor is it inconsistent in the same man to rise to fervid hopes for the future, and the argument from silence is especially precarious in a case like this. The Epistle to the Nine and a Half Tribes (lxxviii.–lxxxvi.) has the appearance of being a later addition; the Epistle to the Exiles in Babylon referred to in lxxvii. 12, 17, 19 may once have formed a part of the book, though now lost; and there are probably some interpolations. But in the main the book is likely to be the work of one author. In the visions and the prophecies as well as in the laments there are many passages that show true poetic inspiration. Consult: Ceriani, *Monumenta sacra et profana*, v. ii (1866); Langen, *De Apocolypsi Baruch* (1867); Hilgenfeld, *Messias Judæorum* (1869); Rosenthal, *Vier apocryphische Bücher* (1885); Kabisch, in *Jahrbucher fur protestantische Theologie* (1891); De Faye, *Les Apocalypses juives* (1892); Ginzberg, in *The Jewish Encyclopædia* (1902); Wellhausen, *Skizzen und Vorabeiten*, vi (1899); Ryssel, in Kautzsch, *Apokryphen und Pseudepigraphen des A. T.* (1900); Charles, *Apocalypse of Baruch* (1896); id., in *Apocrypha and Pseudepigrapha of the Old Testament* (1913).

3. *The Greek Apocalypse of Baruch.* An apocryphal book referred to by Origen (*De Principiis*, ii. 3, 6), discovered by Butler in the British Museum in 1896, and published by James in 1897. A shorter Slavonic version had already been published by Novakovic in 1886. Both the Greek and the Slavonic manuscripts come from the sixteenth century. It claims to be a revelation given to Baruch when he sat weeping over the captivity of Jerusalem near the beautiful gates where the Holy of Holies lay. He is said to have been carried by the angel Phanuel through the heavens on a 185 days' journey. Originally there was probably an account of all the seven heavens, referred to in Testaments of the Twelve Patriarchs, Slavonic Enoch, and Ascension of Isaiah. The Slavonic version mentions only two heavens. Of special interest is the description of the bird Phœnix which may show Indian influence, as well as the rôle assigned to the angel Michael as the mediator between God and men and the holder of "the keys of the kingdom of heaven." The author seems to be acquainted with Slavonic Enoch, written in the second half of the first century A.D., and probably wrote in Greek. There is a long Christian interpolation in chap. iv., occasioned by the remark in the text that the fruit of the vine caused the fall of Adam, and intended to reconcile the harmfulness of wine with its use in the Eucharist, and also a quotation from Matt. xxv. 20 in xv. 4. In all probability the book was written toward the end of the second century A.D. Consult: Stojan Novakovic, in *Starine*, vol. xviii (1886); Bonwetsch, in *Nachrichten der K. Gesellschaft der Wissenschaften zu Göttingen* (1896); James, in *Texts and Studies*, vol. v (Cambridge, 1897), giving the Greek text; Morfill, ib., giving an English translation of the Slavonic text; Ryssel, in Kautzsch, *Apokryphen und Pseudepigraphen d. A. T.* (1900); Ginzberg,

in the *Jewish Encyclopædia* (1902); Hughes, in Charles, *Apocrypha and Pseudepigrapha of the Old Testament* (1913).

4. *The Rest of the Words of Baruch.* An apocryphal book of which the Greek text was first published in *Menæum Græcorum* (Venice, 1609), then by Ceriani, *Monumenta sacra et profana*, v, i (1868) under the title "Paralipomena Jeremiæ prophetæ," and finally by Rendel Harris in 1889, the Armenian version in a collection of *Uncanonical Books of the Old Testament*, vol. i (Venice, 1896), and the Ethiopic version by Dillmann in 1866 as *Reliquæ Verba Baruchi.* It tells of the concealment of the sacred vessels by Jeremiah, his deportation to Babylon, and Baruch's stay in Jerusalem; how before the fall of the city Abimelech (Ebedmelech, Jer. xxxviii. 7 ff.) was sent to Agrippa's vineyard to get figs, fell asleep and did not wake up until 66 years later; of the letter that Baruch sent to Babylon with the figs that were still fresh after 66 years, and the return of the exiles led by Jeremiah, and how Jeremiah died, but rose again from the dead after three days and praised the redemption that had come through Jesus Christ. Aside from the obvious Christian interpolations, the work is clearly of Jewish origin and is supposed by many scholars to have been written soon after 135 A.D. Consult the Greek text in Rendel Harris, *The Rest of the Words of Baruch* (1889); the Ethiopic text in Dillmann, *Chrestomathia Æthiopica* (1866); German translations of the Ethiopic text by Prätorius, in *Zeitschrift für wissenschaftliche Theologie* (1872) and König in *Studien und Kritiken* (1877); cf. also Schürer, *Geschichte des jüdischen Volkes* (4th ed., 1909).

**BARUCH,** BERNARD MANNES. Financier and industrial organizer. He graduated at the College of the City of New York in 1889, and was for many years a member of the New York Stock Exchange. After a highly successful financial career, he entered the government service in the war with Germany and was placed in charge of the purchases for the War Industries Board and for the Allies. He was chairman of the War Industries Board, March 5, 1918–Jan. 1, 1919, and later chairman of the raw materials division of the Supreme Economic Council and economic adviser for the American Peace Commission. He was regarded as one of the ablest organizers of war time.

**BARUCH,** SIMON (1840–1921). German-American physician, served with distinction in the Confederate army in the Civil War, then practiced medicine at Camden, N. J. till 1881, and after that in New York. He became especially known for his diagnosis of "perforating appendicitis" (1889). It was through his efforts that New York was induced to make provision for free municipal baths. By the College of Physicians and Surgeons of Columbia University Dr. Baruch was appointed professor of hydrotherapy. Besides numerous papers contributed to medical journals, his writings include *Uses of Water in Modern Medicine* (1892), and *The Principles and Practice of Hydrotherapy* (3d ed., 1908). Both these books have been translated into German.

**BARUGO,** bä-rōō'gō. A town in the province of Leyte, Philippines, 18 miles northwest of Tacloban, the capital of the province. Pop., 1903, 12,360.

**BA'RUS,** CARL (1856– ). An American physicist, born at Cincinnati, Ohio. He was appointed professor of physics in Brown University in 1895 and in 1903 became dean of the Graduate Department. For the Geological Survey he made researches in physical geology, for the Weather Bureau in atmospheric moisture, and for the Smithsonian Institute in aëronautics. He was elected a member of the National Academy of Sciences and was in 1895 one of the committee selected by Congress to determine the electrical standards of the United States. He prepared a report on high-temperature measurement, as submitted to the International Congress of Physicists at the Paris Exposition in 1900. He contributed valuable papers to the bulletins of the United States Geological Survey, including *The Electrical and Magnetic Properties of the Iron-Carburets* (1885), *Subsidence of Fine Solid Particles in Liquids* (1886), *Measurement of High Temperatures* (1889); *Experiments with Ionized Air* (1901), *Nucleation of the Atmosphere* (1905), *Condensation of Vapor as Induced by Nuclei and Ions* (4 vols., 1907–10), *Elliptic Interferences* (1911).

**BAR'WOOD.** See CAMWOOD.

**BARY,** bä'rē, HEINRICH ANTON DE. See DE BARY, HEINRICH ANTON.

**BARYATINSKI,** bär'yä-tēn'skē, ALEXANDER IVANOVITCH, Prince (1815–79). A Russian field marshal. After the accession of Alexander II he received chief command of the Army of the Caucasus (1856), and after directing three successful campaigns led the storming of Ghunib (1859), where he captured the Caucasian leader Shamyl. In recognition of these services he was appointed field marshal, but, owing to ill health, was compelled to retire soon afterward.

**BARYE,** bä'rē', ANTOINE LOUIS (1795–1875). A celebrated French sculptor of animals. He was born in Paris, Sept. 24, 1795. He inherited his artistic gift from his father, who was a proficient silversmith from Lyons. He began his practice of art by working with an engraver and a goldsmith. He was conscripted in 1812 and during his service is said to have modeled several relief maps for the government. He turned his attention to sculpture in 1818, when he studied modeling under Bosio and drawing under Gros. In 1819 he took a second prize at the Ecole des Beaux-Arts and a little later began devoting himself to the study of animals, and in this branch of sculpture he achieved fame. In the Salon of 1831 Barye exhibited his famous "Tiger Tearing a Crocodile" (Louvre). He gained even greater success with his "Lion Battling with a Serpent" (1832), purchased by the state for the Tuileries Garden, and found in the Duke of Orleans a liberal patron. Sometimes rejected by the jury, and not receiving the recognition by his fellow artists that he believed his due, Barye ceased sending to the Salon and gave himself finally to the production of bronzes for commerce. By this, through public appreciation, which was not lacking for his work, he raised this industry to the plane of art, and it is through these little masterpieces that he is most widely known. The posthumous exhibition of his drawings at the Beaux-Arts was the talk of Paris for the wonderful accuracy and research displayed in the studies of the anatomy, character, and movements of the various animals which he represented. Some of his work is heroic in size and ornaments public parks in France. The architect of the Louvre employed him to make four groups for the pavilion on the Place du Carrousel. Barye re-

was decided when either team scored 21 *runs*, and in the Hoboken contest this required only four *innings*. The rules at that time also provided that the *batter* was *out* if the ball he hit was caught on the first bounce or if, when running between the bases, he should be struck with the ball thrown at him by a member of the opposing team. Another interesting feature was that the *pitcher* delivered the ball to the batter with a straight-arm motion. He was, in fact, a "pitcher" and not a "thrower" as now.

In 1850 another team appeared, known as the "Washingtons," and later as the Gotham Club, which had grounds in Yorkville. Other clubs soon sprang up, and, by 1858, 25 organized teams were playing baseball in and about New York City. It was in 1858, too, that the National Association of Baseball Players was founded and a new code of playing rules adopted. That year also was noteworthy in baseball history as the one in which an admission fee (50 cents) to a game was first charged, the occasion being the match on July 20 between New York and Brooklyn teams at the Fashion Race Course.

The next stage in the development of the game was the organization in 1869 of the first professional club, the Cincinnati "Red Stockings." This team during 1869 and 1870 traveled 12,000 miles and played to more than 200,000 persons, thus giving the first indication of the popularity the sport was destined to attain. A natural outcome of this first experiment in professional ball playing was the organization in 1871 of the National Association of Professional Baseball Players by the members of 10 clubs and the arrangement of a series of contests between them. Only eight teams finished the season. They were the Athletics of Philadelphia, the Bostons, the White Stockings of Chicago, the Haymakers of Troy, the Mutuals of New York, the Forest Citys of Cleveland, the Nationals of Washington, and the Forest Citys of Rockford.

Gambling and drinking and the occasional "throwing" of games brought on a crisis in 1875 and most of the professional clubs were on the verge of bankruptcy. A movement headed by W. A. Hurlbert, A. G. Spalding, and others for the renovation of the sport and for placing it on an honorable basis resulted in the National League of Professional Baseball Clubs. But the most serious crisis occurred in the spring of 1920 when several of the members of the Chicago American League Club confessed that they had received money from a gambling combine to "throw" games in the world's series with the Cincinnati National League Club which was contested in October, 1919. As a result, the Chicago Grand Jury indicted eight of the star players of the Chicago Club and Charles A. Comiskey, president of the Club, expelled them. This scandal dealt such a blow to the national game that it was determined to effect a thorough reorganization and place the supreme control in the hands of a competent and disinterested person. Kenesaw Mountain Landis, a Federal Judge of Chicago, was chosen. One of Judge Landis's first moves was to issue an edict that the players of the Chicago American League Club, who had been involved in the world's series scandal of 1919, should be barred forever from playing with any club in organized baseball. This prompt action together with certain reforms in the politics of the game restored baseball to popular favor.

Morgan G. Bulkeley became the first president of the league, and the clubs represented were: Boston, Cincinnati, Hartford, Chicago, Louisville, New York, Philadelphia, and St. Louis. The first pennant race was won by Chicago, with Hartford second. Other pennant winners in the National League have been: 1877, Boston; 1878, Boston; 1879, Providence; 1880, Chicago; 1881, Chicago; 1882, Chicago; 1883, Boston; 1884, Providence; 1885, Chicago; 1886, Chicago; 1887, Detroit; 1888, New York; 1889, New York; 1890, Brooklyn; 1891, Boston; 1892, Boston; 1893, Boston; 1894, Baltimore; 1895, Baltimore; 1896, Baltimore; 1897, Boston; 1898, Boston; 1899, Brooklyn; 1900, Brooklyn; 1901, Pittsburgh; 1902, Pittsburgh; 1903, Pittsburgh; 1904, New York; 1905, New York; 1906, Chicago; 1907, Chicago; 1908, Chicago; 1909, Pittsburgh; 1910, Chicago; 1911, New York; 1912, New York; 1913, New York; 1916, Brooklyn; 1917, New York; 1918, Chicago; 1919, Cincinnati; 1920, Brooklyn; 1921, New York.

The National League was the forerunner of hundreds of other leagues throughout the United States and Canada, all being conducted under the same general principles. Of these organizations the most important are American League, International League, American Association, Southern League, Eastern Association, Western League, Pacific Coast League, and New England League. Of these leagues the strongest is the American League, which was founded in 1900. Starting as a rival league to the National, the American later entered into an agreement with the older body, and the two work in harmony.

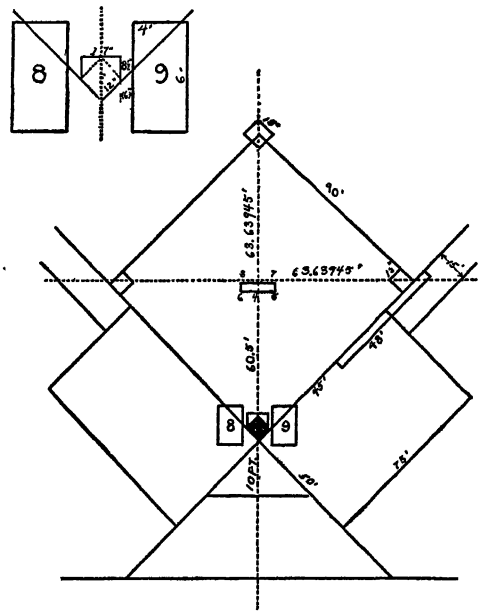
The pennant winners in the American League have been: 1900, Chicago; 1901, Chicago; 1902, Philadelphia; 1903, Boston; 1904, Boston; 1905, Philadelphia; 1906, Chicago; 1907, Detroit; 1908, Detroit; 1909, Detroit; 1910, Philadelphia; 1911, Philadelphia; 1912, Boston; 1913, Philadelphia; 1916, Boston; 1917, Chicago; 1918, Boston; 1919, Chicago; 1920, Cleveland; 1921, New York.

The principal event in the professional baseball world is the playing of a series of games between the winning teams of the two strongest leagues for the world's championship. These contests, which began in 1884, attest in no uncertain way the great popularity of baseball with the masses of the people. They attract as a rule more than 150,000 spectators, and the receipts, which are divided between the players, clubs, and National Commission, often amount to more than $300,000. The first world's championship was won by the Providence National League team in 1884, the opposing team being the Metropolitans. Other holders of the world's title have been: 1886, St. Louis (A. A.); 1887, Detroit (N. L.); 1888, New York (N. L.); 1889, New York (N. L.); 1892, Boston (N. L.); 1894, New York (N. L.); 1895, Cleveland (N. L.); 1896, Baltimore (N. L.); 1897, Baltimore (N. L.); 1903, Boston (A. L.); 1905, New York (N. L.); 1906, Chicago (A. L.); 1907, Chicago (N. L.); 1908, Chicago (N. L.); 1909, Pittsburgh (N. L.); 1910, Philadelphia (A. L.); 1911, Philadelphia (A. L.); 1912, Boston (A. L.); 1913, Philadelphia (A. L.); 1916, Boston (A. L.); 1917, Chicago (A. L.); 1918, Boston (A. L.); 1919, Cincinnati (N. L.); 1920, Cleveland (A. L.); 1921, New York (N. L.).

In 1874, a team from the United States played several games in Great Britain. In 1888–89 two American teams visited New Zealand, Australia, Egypt, Italy, France, and Great Britain.

In the American colleges baseball early became a favorite game. The first recorded intercollegiate match was played at Pittsfield, Mass., July 1, 1859, between Amherst and Williams, the former winning by a score of 66 to 32. Before the game it was agreed to play until one of the teams scored 65 runs, and it is interesting to note that it required four hours to finish the contest. Various attempts have been made to establish an intercollegiate baseball league patterned after the professional organization, but they have invariably met with failure. This fact makes it impossible to determine definitely which of the colleges turns out the best team from year to year, and the college championship title is always in dispute. The colleges which have made the best showings in baseball, often developing teams which have gained victories over strong professional clubs, include Princeton, Harvard, Yale, Williams, Brown, Virginia, Georgetown, and Pennsylvania. Many of the best professional players are men who gained their knowledge of the game while in college.

*The Game*—Baseball is played by nine men in each team, on a level field, on which is laid out




the form of a "diamond" 90 feet square, with bases at each of the four corners (see diagram). One of these bases is called the home plate, and the others (beginning with the right) first, second, and third respectively. Within the diamond, in front of the home plate and 60.5 feet from it, is the pitcher's position, or "box."

The home team has the choice of innings—which team shall take the position "in the field" or "take the bat." The fielders are divided into the *battery* (pitcher and catcher), the *infield* (the three basemen and shortstop), and the *outfield* (left, centre, and right fielders).

The fielding side having taken position, the pitcher delivers the ball to the batsman standing at the home plate, who endeavors to hit it out of the reach of the fielders and thereby succeed in reaching first base before the opposing side can field the ball to the baseman standing there. If the batsman fails to reach the base, he is called "out." If he should reach the first base, and think it safe to do so, he next tries to reach the second base, and the third, or even the home plate. When he has stopped at any base, another batsman of his side is put in, and he in turn attempts to hit the ball so as to allow the first batsman to advance around the bases, while he, in his turn, attempts to reach the first or any succeeding base. Then a third batsman of the same side comes up, and so on, until three men are put out in any way, when the other side takes its turn at the bat. A circuit of the bases is called a "run," and if any player makes it on a single hit it is called a "home run." A "strike" is called (1) when the batsman fails to strike at a ball that passes over the home plate between his knee and shoulder; (2) if he strikes at any ball and fails to hit it; (3) in case of a foul hit, i.e., one that drops or rolls outside the lines from the home plate to first and third bases, but the third strike, however, is not called on a foul.

The batsman becomes a base runner (1) after three strikes are called; (2) when he makes a fair hit, the ball traveling between the above-mentioned lines until after it passes first or third base; (3) after four balls have been called by the umpire, a "ball" being a pitched ball which is not struck at by the batter and which passes outside the limits required for a strike; (4) if he is hit by the ball, unless he has made no effort to avoid it; and (5) if prevented from striking by the interference of the catcher. In the last three cases he cannot be put out before reaching first base. He is put out (1) when his third strike is held by the catcher or fielded to first base ahead of him; (2) when a ball hit by him is caught by a fielder before it touches the ground; (3) when touched with the ball in the hands of a fielder while between bases; (4) when, if forced to run to any base, the ball is held by a fielder on that base before the runner reaches it; and (5) when hit by a batted ball. Nine innings for each side constitute a game, and the team scoring the greater number of runs wins. In case of a tie at the end of the ninth inning the play is continued until one side scores more than the other in the same number of innings.

For complete rules and other information concerning baseball, consult Chadwick, "Official Baseball Guide," in the *Spalding Athletic Library* (New York, annually). For practical instruction: Chadwick, *Art of Pitching, Fielding, and Base-Running* (New York, 1886); J. M. Ward, *Baseball* (Philadelphia, 1888); A. G. Spalding, *America's National Game* (New York, 1911).

**BASE-COURT,** bās'kōrt (Fr. *basse-cour*, low court). The lower or outer court of a mansion, corresponding to the outer bailey of a castle (q.v.); the service court.

**BASEDOW,** bä'ze-dō, or **BASSEDAU,** JOHANN BERNHARD, often called BERNHARD VON NORDALBINGEN (1723–90). A German educational reformer of the eighteenth century. He was born at Hamburg and studied philosophy and theology at the University of Leipzig. He became professor of moral philosophy in the Academy of Sorö in Denmark in 1753; was transferred to the gymnasium at Altona in 1763, but was soon again compelled to give up teaching, though he retained his salary. At both Sorö and Altona Basedow had fallen into difficulties on account of his extremely unorthodox

religious views, expressed in both his teaching and his writings. While at Altona he came under the influence of Rousseau's *Emile*, and in 1767 definitely abandoned theology for educational affairs. His important position in education was due to his attempt to interpret and put into practical application the revolutionary ideas of Rousseau, by proposing a general reform in education in Germany in respect to organization, methods of instruction and the training of teachers. In 1768 he issued *An Address to the Friends of Humanity and to Persons in Power, on Schools, on Education, and its Influence on Public Happiness*, which included the plan for his *Elementarwerk*, a complete new system of primary education. This was received with favor, and his appeal for funds with which to publish the proposed treatise met with generous response. The *Elementarwerk*, an illustrated work in four volumes, was issued in 1774 and exerted a wide influence. The ideas underlying the work were a combination of the methods of the *Orbis Pictus* of Comenius (q.v.) and the general principles advanced by Bacon and Rousseau. It contained a vast amount of general information arranged in dialogue form and designed to direct and train, but never to suppress, the natural desires of children. Public approval of the ideas advanced was generous, and Basedow immediately outlined a plan for the training of teachers for the new education.

The resulting institution was the celebrated *Philanthropinum*, founded at Dessau in 1774 and soon imitated in various parts of Germany. Basedow was unfit for the management of such an institution, however, and failed in carrying out his own ideas. The *Philanthropinum*, under more competent hands, continued to exist until 1793 and exerted a wide influence on the education of children throughout the Teutonic world. Basedow passed the last year of his life in private tutoring. The fundamental idea of the reform was "education according to nature," which was interpreted to mean that children should be treated as children, not as adults; that language should be taught by conversational methods, not through grammatical studies; that physical exercise and games should find a place in the child's education; that early training should be connected with "motion and noise," since the child naturally loves these; that each child should be taught a handicraft, for reasons partly educational, partly social; that the vernacular, rather than the classical languages, should constitute the chief subject-matter of education; that instruction should be connected with realities rather than with words. Many of the reforms suggested by Basedow were carried out by more practical and less erratic reformers, such as Pestalozzi and Froebel. Prof. Max Müller, Basedow's great-grandson, contributed a "Life" of the reformer to the *Allgemeine deutsche Biographie*. A comparison of Basedow and Comenius by Petru Garbovicianu (Bucharest, 1887) is commended by Quick.

Consult: Quick, *Educational Reformers* (New York, 1890); Barnard, *German Teachers and Educators* (New York, 1861); Pinloche, *L'Education en Allemagne au dix-huitième siècle* (Paris, 1889); Diestelmann, *Basedow* (Leipzig, 1897).

**BASEDOW'S DISEASE**, GRAVES'S DISEASE, or EXOPHTHALMIC GOITRE. A disease characterized by palpitation of the heart, rapid pulse, enlargement of the thyroid gland, anæmia, general nervousness, fine tremor and prominence of the eyeballs. It was first fully described by Von Basedow in 1840. The etiology is obscure; the exciting cause may be mental or physical shock, or anxiety or grief, fright, fatigue, sexual excess in those with a nervous inheritance; but the disease is always associated with increased activity of the thyroid gland—hyperthyroidism. It is 8.3 times as frequent in females as in males. The modern treatment of this affection is very satisfactory. The gland may be reduced in size and the symptoms relieved by the application of the X-ray; serum therapy cures many cases, and surgery attacks the problem by ligating the superior thyroid arteries, resecting the hypertrophied portions of the gland, or removing the cervical sympathetic ganglion. Consult article by Dock in *Osler's Modern Medicine*, vol. vi (New York, 1909); for early literature, article by same author in the *Jour. Amer. Med. Assoc.*, p. 1121 (1908); Mannheim, *Der Morbus Gravesii* (Berlin, 1894).

**BASEILHAC**, bà'zâ'lyâk', JEAN (1703–81). A French surgeon, better known as Frère Côme. He was educated at the Hôtel-Dieu, Paris, and for some time was physician in ordinary to the Archbishop of Bayeux. He invented the "trocar," used in cystotomy, and wrote *Recueil de pièces importantes concernant la taille faite par le lithotome caché* (1751) and *Nouvelle méthode d'extraire la pierre de la vessie urinaire par dessus de pubis* (1779).

**BASEL**, bä'zel, or **BÂLE**, bäl (anciently, *basilia*, royal residence, from Gk. *βασιλεύς*, *basileus*, king; *basula* in the Middle Ages). The capital of the half-canton of Basel-Stadt, Switzerland; lying on both sides of the Rhine, near the northern boundary of Switzerland (Map: Switzerland, B 1). The city is situated in a charming plain over 800 feet above the sea level and is divided by the river into Grossbasel and Kleinbasel. The former, the higher portion of the city, is on the left bank and is connected with Kleinbasel by three bridges, one of which, a fine granite structure, was completed in 1905, replacing the wooden Alte Brücke (Old Bridge), which was built in the early part of the thirteenth century. The city proper shows its mediæval origin, but about it are charming suburbs, occupied by the richer classes. The old ramparts have been leveled to form walks and promenades. In the Eschenplatz stands the Sankt Jakob Monument, to the memory of the Swiss who opposed the Armagnac invaders in 1444. Other memorials are the Strassburg Monument, by Bartholdi, commemorating the aid given by Switzerland to the women and children of that city after the siege of 1870, and the Holbein Fountain, restored in 1887.

Basel abounds in fine buildings, both mediæval and modern. Among these may be mentioned the Rathaus or Town Hall, built in the first quarter of the sixteenth century, and restored early in the twentieth; the Minster, said to have been begun by Emperor Henry I, and the cathedral of the bishopric of Basel until 1529; and the large Barfüsser Kirche, dating from the fourteenth century. The latter has a very high choir and is now the quarters of the Historical Museum, which vies with that of Zürich as the finest in Switzerland. Other notable buildings are the church of St. Elizabeth, the church of St. Paul, the Natural History and Art Museum, the Kunst Halle, containing a

collection of modern paintings, the theatre, and the post office.

Basel has a university which dates from 1459. (See BASEL, UNIVERSITY OF.) The botanical gardens and the institute of natural sciences, as well as the clinics attached to the city hospitals, are affiliated with the university. Besides the university there are several high schools and an industrial school and museum. The Historical Museum, which has been mentioned, contains some portions of the celebrated Danse Macabre, formerly a fresco in the Dominican burial ground and removed in 1805, besides a fine collection of mediæval furniture and plate. Basel was the home of the Holbeins, and the museum contains a valuable collection of their works and those of their pupils. There are several literary, musical, historical, and scientific societies. A notable organization is the Association for Public Welfare, which cares for schools and other institutions designed for the bettering of the condition of the poor and the afflicted, such as the blind, stuttering, etc. Basel's hospitals include a Polyclinic supported by the state, while its mission house and Bible Institute are world-famous.

Basel has long been the leading commercial town of Switzerland and an important manufacturing centre. For more than 200 years ribbon making has been an important occupation. Other branches of industry are paper making, silk and thread spinning, dyeing and dye making, and the preparation of the "Bascler Leckerli," or honey cakes. Total number of factories in Basel-Stadt in 1911, 287; with 15,639 work people (9723 men, 5916 women). The position of the city on the boundaries of Switzerland, Alsace, and Baden, and its location on the Rhine, here navigable, give it great advantages for trade, and it receives more than 50 per cent of the total imports of Switzerland. It is an important centre for the transport of the native products of the country, and as a result Basel is the most powerful financial city of Switzerland. Besides the communications given by the Rhine and the Rhine-Rhone canals, railroads from various parts of Switzerland form a junction in Basel, permitting connections with France.

The Basel-Stadt demicanton consists of the city and two rural communes; the cantonal councils have general jurisdiction over the city. In 1888 the population of the city was 74,245; in 1900, 112,885; according to the census taken Dec. 1, 1910, the *de facto* population of the city was 132,577 (*de jure*, 132,276), and of the rural communes 3771 (3672). Of these over two-thirds are Protestants, less than one-third Catholics, with about 3000 Jews.

Basel had its origin in the *Basilia* of the Romans, a frontier post situated near the town of Augusta Rauracorum. It was taken in turn by the Alemanni and the Franks, and on the partition of Charlemagne's Empire passed to Louis the German. In the eleventh century it enjoyed great prosperity as a free Imperial city, ruled by its bishop and the chief nobility. In the course of many years the burghers acquired a large share in the municipal government, while at the same time the authority of the city, by purchase and conquest, was extended over a broad stretch of territory. Basel fought with the Swiss confederates against the Hapsburgs in 1444 and formally joined the Confederacy in 1501. The Reformation made rapid progress in Basel. The government of the city became thoroughly democratic, but towards the inhabitants of the rural districts of Basel a policy of consistent selfishness was followed, in that they were allowed no share in the political life of the community for nearly three centuries. Under the impulse of the French Revolution equality of rights was established, but the city became supreme again after 1814. Civil war broke out as a result in 1831 and continued until 1833, when the Federal government intervened and brought about the division of the canton into *Basel-Stadt* and *Basel-Land*. The latter immediately established democratic institutions, but Basel-Stadt maintained its reactionary character till well into the second half of the nineteenth century. Consult *Guide to Basel and Environs* (Basel, 1895).

**BASEL**, CONFESSION OF. 1. Written by Oswald Myconius (q.v.), and published in 1534, still used in Basel. 2. The First Helvetic Confession (1536), also called The Second Confession of Basel, because there drawn up. It was too Lutheran and so was supplanted by the Second Helvetic Confession (1564). Consult Schaff, *Creeds of Christendom* (New York, 1884).

**BASEL**, COUNCIL OF. A memorable and important ecclesiastical council, held in the city of Basel from 1431 to 1449. It was summoned by Pope Martin V, by a bull dated Feb. 1, 1431, and constituted after a fashion on February 27, but after the Cardinal legate, Julian Cesarini of Sant' Angelo, who had been charged with the conduct of the council, arrived, Sept. 9, 1431, more life was put into it. Its chief business being to conciliate the Hussites, it at once opened negotiations with them. But the new Pope, Eugenius IV, disliked the proceedings, and requested Cesarini on November 12 to dissolve the council and call another a little later at Bologna. Ere the letter came the council had formally constituted itself (December 14), and when the Pope's letter arrived it flatly refused to dissolve, and reaffirmed the decree of the Council of Constance, asserting the right of a general council to exercise authority over the Pope himself, and on his persevering to issue bulls for its dissolution, caused a formal process to be commenced against him and cited him to appear at its bar. It assumed the papal powers, and exercised them in France and Germany, where its authority was acknowledged. It concluded a peace, in the name of the Church, with the Calixtines, the most powerful section of the Hussites, by the so-called Compactata of Prague of Nov. 30, 1433, granting them the use of the cup in the Lord's Supper. By this the Emperor Sigismund was greatly aided in recovering possession of Bohemia; and he in return sought to reconcile the council with Eugenius IV, who, being hard pressed by insurrections in the States of the Church, and, afraid of losing his whole influence in France and Germany, came to a temporary agreement with the council Aug. 1, 1433. Desirous, however, of limiting the papal prerogatives, the council restored to the chapters of cathedrals and collegiate churches the free right of election to stalls and benefices, of which the Pope had assumed the right of disposing; and with a view to the reformation of gross abuses, restricted the practice of appeals to Rome and prohibited *annats* and other grievous exactions. It left the Pope the right to dispose of those benefices only which belonged to the diocese of Rome and prohibited

the bestowal of reversions to ecclesiastical offices. It also appointed punishments for certain immoralities in the clergy; and prohibited "festivals of fools," and all the indecencies which had been commonly practiced in churches at Christmas. It adopted decrees concerning the election of Popes and for the regulation of the College of Cardinals.

Eugenius, exasperated to the utmost, complained loudly to all sovereign princes. At this time the prospect was opened up of the union of the distressed Greeks with the Church of Rome, and both the Pope and the council endeavored to make use of this for the advancement of their own interests and influence. Both dispatched galleys for the Greek deputies; but through the intrigues of his agents, the Pope was successful and brought the Greek deputies to Ferrara. The Archbishop of Taranto, a papal legate at Basel, circulated an ordinance in the name of the council, and sealed with its seal, recommending Udine or Florence as the place of conference. This was a high-handed proceeding, as not the council, but only a minority of the council, desired such a transfer, and the use of the seal was unauthorized. The Archbishop of Taranto was arrested, but he escaped. Yet the Pope followed the minority and issued a bull calling a council at Florence.

This proceeding put an end to forbearance on the part of the council, which, on July 31, 1437, again summoned the Pope to its bar and, on his failing to appear, not only declared him contumacious (Oct. 11, 1437) but, on his transferring the council to Ferrara, went so far as (on Jan. 24, 1438) to decree his suspension from the functions of the papacy. His party was, however, so strong that this decree could not be carried into effect; while some of those who had been among the more influential members of the council, the Cardinal legate Julian himself, and the greater number of the Italians, had shortly before left Basel and gone over to the Pope's side. All the more resolutely did Cardinal Louis d'Allemand, Archbishop of Arles, a man of most superior understanding, courage, and eloquence, now guide the proceedings. On May 16, 1439, the council declared the Pope a heretic for his obstinate disobedience to its decrees; and on June 25, 1439, formally deposed him for simony, perjury, and other offenses, and elected in his stead Amadeus VIII of Savoy, who called himself Felix V (q.v.).

In the latter part of 1443 Felix V left Basel and went to Lausanne. On May 18, 1448, Frederick III forbade the city of Basel longer to harbor the council. So, on June 25, it decreed its transfer to Lausanne; and there, on April 25, 1449, it decreed its dissolution. The council had shown itself powerless to effect the reforms in the Papal Curia with which it had set out and was on the whole a failure. Its reforming decrees are held to be invalid by the Roman Catholic canonists; but extreme Gallicans, such as Richer, recognize it as ecumenical all through, and the more moderate ones, with Natalis Alexander, up to the prorogation to Ferrara.

Consult: *Monumenta Conciliorum Generalium Sæculi XV* (Vienna, 1857–96), *Concilium Basiliense; Studien und Quellen zur Geschichte des Konzils von Basel,* edited by Von Haller (3 vols., Basel, 1896–1900); also C. J. Hefele, *Konziliengeschichte,* vol. vii (Freiburg, 1891).

**BASEL,** TREATIES OF. Two important treaties of peace, concluded at Basel on April 5, and July 22, 1795, the first between France and Prussia, the second between France and Spain. Prussia withdrew from the coalition against France, took under her protection all the states of northern Germany which should, like herself, relinquish the war in which the German Empire was engaged, and gave up her possessions beyond the Rhine. The treaty is important in that it put back for some time all possibility of German unity. Spain gave up her portion of Haiti and prepared the way for that alliance with France which was afterward productive of consequences so important during the Napoleonic wars.

**BASEL,** UNIVERSITY OF. A university authorized by a papal bull in 1459 and opened in 1460. During the Reformation it was reorganized on a Protestant basis and became the stronghold of Protestant scholarship and as such exerted an influence throughout the world. Erasmus, who came to Basel in 1520, and Œcolampadius, who came in 1523, were among the famous teachers, and, at a later day, Euler and the Bernoullis were renowned professors of mathematics there. Basel is now the chief seat of theological study in Switzerland. It has also faculties of law, medicine, and philosophy, a library of over 250,000 volumes and 4000 MSS., chiefly dealing with the Reformation, besides other valuable collections and museums. There were in 1912–13 nearly 950 students in attendance.

**BASE LEV'EL.** See PHYSIOGRAPHY.

**BASE LINE.** See GEODESY and SURVEYING.

**BASEL'LA** (probably a native name in Malabar). A genus of tropical plants belonging to the family Chenopodiaceæ. The genus is now believed to consist of but one species, *Basella alba.* Various forms of this are cultivated in the tropics as pot herbs, and in the neighborhood of Paris plants are sometimes raised in hotbeds and planted out as a substitute for spinach.

**BASE'MENT** (Fr. *bas,* low; cf. Eng. *base,* low, mean). In architecture, the lower story of a building when not its main story. It is usually distinguished from the rest of the house by a simpler and more massive architectural treatment. Mediæval and Renaissance palaces were almost invariably built with basements, which contained porter's lodge, storerooms, offices, etc.; the windows were smaller than those of the other stories and often barred. In many cases this basement itself consisted of two stories, the upper one being a mezzanine where the servants had their quarters. In modern public buildings generally the main first story is usually raised above a basement of more or less importance. In American city residences (especially in New York) the names "American," "English," and "French" are applied to different types of basement, with reference to their interior arrangement; but these terms are arbitrary and local.

**BASE OF OPE'RATIONS.** The base or point from which active operations against an enemy are directed or organized, and from which are issued such stores and munitions of war as may be required by the force whose base it is. In countries sparsely populated, armies, and particularly the invading army, must be victualed and supplied from their own base. Lines of operation therefore follow navigable rivers or railroads; and the base is fixed at such a point on the line or route as to be as secure as possible from molestation and yet, if necessary, give protection and shelter to the troops, should

they be driven back. The more important field hospitals are also stationed at the base. To separate or cut off an army from its base is practically to defeat it; the attainment or defeat of such an end being a consummation ardently sought for. The history of the American Civil War (1861–65) is full of instances of such manœuvring. Grant's operations against Vicksburg in December, 1862, are a case in point. In the British-Boer War of 1899–1902 England was forced to keep nearly twice as many troops as there were Boers actually in the field for the sole purpose of guarding the various bases of supplies and operations. This was due to the wide area of the theatre of operations, the absence of available rivers, and the necessity of transporting the large quantities of food and ammunition required for the vast armies in the field. In the case of an invading army operating across the sea, a base must be captured by some means and held securely as a preliminary to the campaign. The Japanese in the war against Russia (1904–05) first established a base at Chemulpo, then at Dalny, where all their supplies were landed and whence they were distributed to the army. The capture of this base would have meant disaster to the army.

**BASEY**, bä'sā. A town on the north shore of San Pedro Bay in the province of Samar, Philippines. It is 35 miles southeast of Catbalogan. Pop., 1903, 13,504.

**BASH,** BERTHA RUNKLE. See RUNKLE, BERTHA.

**BASHA.** See PASHA.

**BA'SHAN** (Heb. rich soil, in Gk. *Βασάν, Basan*), or **BAT'ANÆ'A.** A district of Palestine stretching from Mount Hermon in the Antilibanus on the north to the brook of Jabbok (the modern Nahr el Zerka) on the south, and from the Jordan on the west to the boundaries of the Geshurites and Maachathites on the east (Map: Palestine, E 2). Ashtaroth, Edrei, Golan, and Salchah were its chief cities. According to the account in Num. xxi. 33–35, and Deut. iii. 1–3, the last of its Amorite rulers was the giant Og, who with all his sons was killed by the Israelites under Moses at the battle of Edrei and the land given to the half tribe of Manasseh (Josh. xiii. 29–31). Bashan, as a rich pasture land, was famed for its sheep and oxen, which, because of their large size, suggested to the prophets types of oppressors (Amos iv. 1). The oak plantations of Bashan also seem to have made a strong impression on them (Ezek. xxvii. 6; Isa. ii. 13). Bashan corresponds to the district now called Hauran. In Roman times Batanæa formed one of its five provinces, the others being Ituræa, Gaulanitis, Trachonitis, and Auranitis. See HAURAN.

**BASH'FORD,** JAMES WHITFORD (1849–1919). An American educator, born at Fayette, Wis. He graduated at the University of Wisconsin in 1873, studied at the theological school of Boston University, and from 1875 to 1889 was pastor of Methodist Episcopal churches at Boston and Auburndale, Mass., Portland, Maine, and Buffalo, N. Y. In 1889 he was appointed president of the Ohio Wesleyan University and held the office till 1904, when he was made bishop of the Methodist Episcopal church. He took an active part in organizing missionary work and relief measures for the famine in China. He published: *Outlines of the Science of Religion* (1891); *The Awakening of China* (1906); *China and Methodism* (1906); *God's Missionary Plan for the World* (1907).

**BASHI,** bäsh'ī (Turk. *bashi*, head, chief). A generic title for Turkish military officials. Some of the most prominent are: *Toptchjy-Bashi*, general of artillery and inspector of forts, etc.; *Solaki-Bashi*, commander of the archers (now practically extinct); *Sanjak-Darlars-Bashi*, chief of the 50 color bearers; *Konadji*, or *Konakji-Bashi*, quarter master-general (or chief of the barracks); *Boyuk-Bashi*, great high chief, or colonel of a regiment of 1000 militia. Other military and civil Turkish titles are: *Pasha*, general—which title, however, may be conferred as a distinction on naval officers or distinguished professional men in the civil walks of life. It is the Turkish equivalent of the European "Lord," or "Baron," and is the title of viceroys, provincial governors, etc. *Bey*, a civil title equivalent to the English baronet or knight, which may be conferred on all classes, civil or otherwise. *Effendi*, the courtesy title of a gentleman, used in the same relation as the English word "esquire." *Bimbashi*, or *Hinbashi*, is the title adopted in the Anglo-Egyptian army for the colonel of a battalion or regiment; its native usage is "leader of a thousand." *Beg*, or *Beik-Bey* is a title commonly applied to all military and naval officers and distinguished visitors. It applies also to the governor of a small district, who displays a horsetail as an insignia of rank.

**BASHI-BAZOUKS,** bäsh'i-bä-zōōks' (Turk. *bashi*, head, headdress, appearance + *bozug*, spoilt, disorderly, from *boz*, to spoil, damage, destroy). Turkish irregular troops; natives chiefly of the wretchedly governed pashalics of Asiatic Turkey, and possessing the worst reputation of any body or class of fighting men in the world. They are wild, turbulent, and wholly undisciplined, more ready to plunder and kill than to fight, and speak a debased Turkish *patois* not easily understood. Physically, they are, as a rule, men of splendid proportions, their tall red fez adding to their apparent height, while the uniform *ensemble*, not unlike the Scottish Highlander, adds to their picturesque appearance. Their equipment consists mainly of a great number of knives and swords, completely loading the waist belt and compelling them to adopt a gait, peculiar to themselves, caused by the necessity of swinging the arms and legs clear of their equipment. Such rifles as they usually possess are of patterns long since obsolete. They are willing to attach themselves to any leader who understands their jargon and who can promise them plunder, and are frequently used by municipal governors depending on pillage and plunder for their pay. It was thought, during the Crimean War of 1854, that they could be usefully employed against the Cossacks, particularly in the sort of irregular warfare usually waged by them. Consequently, in 1855, when the British government took into its pay a Turkish contingent, a corps of Bashi-Bazouks was put under the command of an officer of the British-Indian army. The experiment, so far as the Bashi-Bazouks were concerned, proved a complete failure, as the war ended before they were even partially reduced to discipline. They frequently torture their enemies and mutilate the dead. It is a matter of record that in May, 1876, under the leadership of Achmet Agha, they slew in cold blood over 1000 defenseless Bulgarians who had sought shelter in a church.

**BASHI** (bä'shē) **ISLANDS.** A small group

of islands, the northernmost of the Batan group in the Philippines. Bashi Channel separates the islands from Formosa.

**BASHKIRS,** bâsh-kērz′. A Finno-Tatar people of Mongolian stock (height, 1.650 meters), living in the Orenburg District of Russia, along the slopes of the Urals. They number about 1,000,000 and subsist on their flocks and herds. In faith, the Bashkirs are Mussulmans. Deniker (1900), who terms them "a tribe mixed with Turkish, Mongol, and Ugrian elements," classes them in the central group of his Turko-Tatar stock, along with the Kirghiz, etc. Consult Ujfalvy, *Les Bachkirs* (1880), and Katarinskij, *Dictionnaire baschkire-russe* (Orenburg, 1900).

**BASHKIRTSEV,** bâsh-kērt′sĕf, MARIE KONSTANTINOVNA (1860–84). A Russian artist and writer, one of the most individual characters in the literary annals of the nineteenth century. She was born near Poltava, Russia, and died of inherited consumption in Paris. Her parents were very wealthy and of noble descent, and their daughter, who was gifted with beauty, an unusual voice, and a mind of remarkable maturity, had the advantage of residence in Rome, Nice, Paris, and other cities, where she moved in the highest society. A weakness of the throat, followed by deafness, obliged her to abandon the hope of achieving fame as a singer, and in her seventeenth year she began the study of art in Paris under Robert-Fleury, pursuing it later under Bastien-Lepage until her death, and producing, in spite of her physical disabilities, paintings of rare merit. Her distinctive work, however, was a journal begun in her thirteenth year and faithfully continued through life. It was designed for publication after her death, and intended to be, to use her own words, "the transcript of a woman's life—her thoughts and hopes, her deceptions, weaknesses, good qualities, sorrows, and joys." She herself believed it to be unparalleled in literature, and the same opinion was expressed by Gladstone, one of her many sympathetic reviewers (*Nineteenth Century*, October, 1889). Consult: *Journal de Marie Bashkirtseff* (Paris, 1887) and the full translation of the same (Chicago, 1890); *Lettres de Marie Bashkirtseff* (Paris, 1891), and *Further Memoirs* (London, 1901). The suppressed portions of her diary have appeared in the *Revue des Revues* (1900).

**BA'SIC BES'SEMER STEEL PROC'ESS.** See IRON AND STEEL, METALLURGY OF.

**BASID'IOMYCE'TES,** bā-sĭd′ĭ-ō-mī-sē′tēz (*basidium*, see below + Gk. *μύκητες, mykētes*, mushrooms, fungi). One of the three great groups of true Fungi, second only to the Ascomycetes in number of species, of which approximately 20,000 are known. The group is characterized by the presence of a "basidium," which produces spores ("basidiospores") in a characteristic way. A young basidium is a cell that contains two nuclei; these nuclei fuse, and this fusion is followed by two successive divisions, resulting in four nuclei. In connection with these nuclear divisions cross-walls may form, so that the mature basidium may be four-celled, or it may remain as one cell with four nuclei. Those Basidiomycetes whose basidia are four-celled are called "Protobasidiomycetes"; while those whose basidia are one-celled are called "Autobasidiomycetes." The mature basidium puts out a delicate branch ("sterigma") for each nucleus (or cell), and into the tip of each sterigma a nucleus migrates. The tip of each sterigma is rounded off to form a spore (basidiospore), which contains the nucleus. Often only two spores are formed, as in the case of the common field mushroom (*Agaricus campestris*), but in this case two of the four nuclei remain in the basidium.

The orders of Basidiomycetes are numerous, but they may be considered under three great groups. The principal forms in one group are the smuts (Ustilaginales, q.v.) and the rusts (Uredinales, q.v.), which are very different from other Basidiomycetes. They have the four-celled basidium (Protobasidiomycetes), but the chief difference is that the basidium is a separate plant, produced by a spore and producing spores (basidiospores).

The two other groups produce a special structure upon the mycelium (the body of the fungus), in connection with which the basidia are formed. In other words, the basidia are a part of the body and not separate individuals. This special structure is a complex "sporophore," formed by many branches from the mycelium. The numerous orders are distinguished by the character of this sporophore.

In one of the groups the basidia, a layer of which is called the "hymenium," are exposed upon the sporophore. Those orders with an exposed hymenium are called "Hymenomycetes," and the representative and largest order is Agaricales, to which the mushrooms, toadstools, and bracket fungi belong. The ordinary form of the sporophore is the toadstool form, with its stalk ("stipe") and cap ("pileus"); but the bracket-like and hoof-like sporophores are also very common. There are three arrangements for exposing the hymenium: one is to expose it as a layer upon the surface of "gills," and hence the family of "gill fungi" (Agaricaceæ); another is to expose the hymenium as a layer lining tubes which open by pore-like openings upon the surface, and hence the family of "pore fungi" (Polyporaceæ); the third is to expose the hymenium as a layer upon the surface of tooth-like projections, and hence the family of "tooth fungi" (Hydnaceæ). Many of these forms are very destructive to forest trees, the mycelium penetrating the wood and causing various kinds of "rot." They invade the trees either by the spores getting into wounds or by a direct invasion of the mycelium in the soil into the roots of the trees.

In the other group the hymenium is completely inclosed by the sporophore, and such orders are called "Gasteromycetes." The representative Gasteromycetes are the puffballs (Lycoperdales). The globular sporophore is differentiated into two regions: a tough jacket ("peridium") and the tissue within ("gleba"). The gleba contains numerous chambers lined with hymenium. So numerous are the basidiospores that when the gleba dries out and the peridium bursts they are puffed out in clouds.

A remarkable order of Gasteromycetes is formed by the "nest fungi" (Nidulariales), in which the sporophore opens into a cuplike structure, and the persistent and separated chambers of the gleba are revealed lying like eggs in a nest. The most highly specialized sporophore among Gasteromycetes is that of the "stink horns" (Phallales), in which a hollow stalk develops within the gleba and elongating rapidly bursts through the peridium, carrying the chambered gleba at its summit like a cap. The gleba thus exposed deliquesces into a slimy, dripping

mass with the odor of carrion, which attracts carrion flies, by whose agency the imbedded spores are dispersed. See Plate of FUNGI.

**BASIL,** băz'il (Gk. *βασιλικός, basilikos,* royal) (*Ocimum*). A genus of plants of the family Labiatæ (q.v.). The species are all natives of the tropics, or of the warmer temperate parts of the world, and are generally characterized by a pleasant aromatic smell and taste. Sweet basil (*Ocimum basilicum*) is an annual plant, a native of the East Indies, about 1 foot high, with ovate or oblong leaves, which has long been cultivated in Europe for seasoning food. Bush basil (*Ocimum minimum*) and tree basil (*Ocimum gratissimum*), also natives of the East Indies, are cultivated in gardens for the same purpose. *Ocimum campechianum* is a native of Florida and tropical America. Basil is a common name for *Pycnanthemum,* a North American genus of many species; also of *Calamintha clinopodium* of Europe and North America. *Acinos vulgaris* (now *Calamintha acinos*) is a native British plant known as basil thyme. Basil is used largely as a seasoning herb in southern Europe, and is becoming more common in the United States, as the Greeks and Italians grow it quite commonly.

**BASIL I** (c.812–886). Byzantine Emperor from 866 to 886, and founder of the Macedonian dynasty. He was of Armenian descent, and when a boy entered the service of Michael the Drunkard (q.v.) as a groom. By his strength and bravery he attracted the Emperor's notice and won his favor. He was promoted rapidly until he was made protostrator. He was the Emperor's boon companion, and after the murder of Bardas, in which he had a share, he was chosen by Michael, in 866, to be his associate in the Empire. The next year Basil, who had obtained a firm control of the government, caused Michael to be murdered. The deed was unrevenged, no party took up the cause of Michael's children, and Basil ruled, until 886, with remarkable ability. Syracuse was lost, but in 878 elsewhere his armies and fleets were successful. At home he reformed the finances, began a recodification of the laws (see BASILICA, 2), and worked earnestly to improve administration. He reinstated Ignatius (q.v.) as Patriarch, and sought to end the schism between the Eastern and Western churches; but in this he failed. The Macedonian dynasty ruled at Constantinople for 190 years. Consult Bury, *Eastern Roman Empire* (London, 1912), and Vogt, *Basile I* (Paris, 1908).

**BASIL II** (957–1025). Byzantine Emperor, the son of Romanus II, at his father's death was only two years old. First his mother, Theophano, then Nicephorus Phocas (963–969), and finally John Zimisces (969–976) ruled the Empire as the guardian of, or co-Emperor with, Basil and his brother. He and his brother Constantine actually became emperors in 976, but Constantine left the government to Basil, who was obliged to carry on almost incessant wars. He suppressed a formidable revolt in Asia Minor in 979, recovered Calabria and Apulia in Italy, and had several conflicts with the Saracens in Sicily. For many years he waged war against the Bulgarians, whom he finally subdued in 1018. Basil, for this victory, won the surname of Bulgaroctonus, "Slayer of Bulgarians." His reign of almost half a century was a period of victory for the Byzantine Empire. Consult Schlumberger, *L'épopée byzantine* (Paris, 1897), and Gibbon, vol. v.

**BA'SIL THE GREAT** (c.330–379). Bishop of Cæsarea in Cappadocia, founder of Eastern monasticism, theologian, and doctor of the Church. He was born at Cæsarea, of Christian parentage, about the year 330 A.D., and died there, Jan. 1, 379. He is often grouped with his brother, Gregory of Nyssa (q.v.), and Gregory of Nazianzus (q.v.), under the general title of "the three Cappadocians," all being distinguished leaders of Trinitarianism and successors of Athanasius. Basil received a careful education, under such teachers as the rhetorician Libanus, at Constantinople, and Himerius, at Athens. Here (351–355) two of his fellow-students and friends were Gregory of Nazianzus and Julian, afterward Emperor. Returning to Cæsarea, Basil entered with zest into the social life of the city and thus aroused the anxiety of his pious sister, Macrina, who wished him to embrace the religious life. This he was soon led to do. He first visited the famous hermits of Syria, Palestine, and Egypt, and then took up his abode in a picturesque spot on the banks of the Iris, in Pontus, where he gathered a few sympathizers about him and spent several years in severe asceticism. His monastic period falls between 357 and 364. The rule of St. Basil is still the standard of the Oriental monks. It was less systematic than that of St. Benedict (q.v.), which arose later in Italy and controlled the monastic development of western Europe, but it included the characteristic features of monachism, viz., a union of active labor and quiet devotion with strict asceticism.

Basil was made presbyter of Cæsarea in 364. His intense activity and devotion to the people soon gave him an influence greater even than that of the local bishop. He went about establishing new communities of monks and founding hospitals, orphanages, etc. During a particularly severe famine (368) his labors were little short of heroic. All this time his theological position was becoming more clearly defined. He had originally sympathized with the mediating party in the Arian controversy (see ARIUS), though his primary interest was not in dogma, but in the practical religious life. But his antagonism to the thoroughgoing Arians led him ever closer to the orthodox side. This attitude aroused hostility, and when the bishopric of Cæsarea became vacant (370), and he was a candidate for the position, there was violent opposition. He was, however, elected, and his administration proved to be vigorous and successful. The office carried with it a virtual primacy of the churches in that part of Asia Minor. He was Metropolitan of Cappadocia and Exarch of Pontus, having many bishops under him, who were often opposed to his policy. But firmness and patience overcame opposition, even from the Arians, his greatest foes. A notable instance of Basil's courage was his withstanding the demands of the (Arian) Emperor Valens, in 372, when, in spite of threats of deposition, the bishop refused to surrender his orthodoxy or grant any favors to heretics. The Emperor is said to have been so impressed by Basil's dignity and courage that he left him in peaceful possession of his see.

As a theologian, Basil ranks below Athanasius and below his brother Gregory. In common with the other Cappadocians he emphasized the trinity rather than the unity of the Godhead. The completed Trinitarian formula asserted one substance (*ousia*) and three persons (*hypostases*).

In the form in which Basil taught this doctrine it laid him open to the charge of tri-theism. One of Basil's greatest disappointments arose from his failure to secure doctrinal harmony between Eastern and Western Christendom. In support of Catholic orthodoxy he was compelled to look toward the West, but his overtures were received with marked coolness at Rome. Pope Damasus never forgave Basil for his failure to recognize the Roman claim to primacy; and Jerome accused him of stubborn pride in thus persistently refusing Damasus due honor. Moreover, Basil's orthodoxy was for a long time under suspicion, for in his early life he had been known to have friends among the Arian heretics. He died before East and West came to an agreement.

Basil was master of a fine literary style. His works include expositions of the Bible, dogmatic, moral, and ascetic treatises, liturgical pieces, and letters. *The Liturgy of St. Basil* is not wholly his work. Some 370 letters are preserved. The best complete edition of his works is the *Benedictine* (3 vols., Paris, 1721–30; reprinted in Migne's *Patrologia Græca*, vols. xxix, xxxii). His chief works are translated into English in the *Nicene and Post-Nicene Fathers*, 2d series, vol. viii (New York, 1895), with valuable prolegomena containing a sketch of his life and an analysis of his works. His most important work, *De Spiritu Sancto*, was edited by Johnston (Oxford, 1892). Consult, in general, Smith and Wace, *Dictionary of Christian Biography*, art. "Basilius of Cæsarea" (London, 1887).

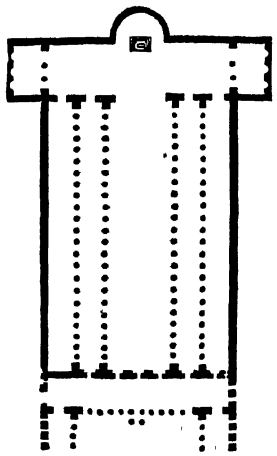
**BASILE**, bȧ-zē'lȧ, GIOVAN BATISTA, COUNT OF TORONE (c.1575–1632). An Italian author, born at Naples. His literary productions in the Neapolitan dialect are most valuable. His *Pentamerone overo lo cunto de li cunti, tratteneniento de' peccerille di Giov. Alesio Abbatutis* (Naples, 1634–37), a collection of 50 folk tales resembling in substance the *Hausmärchen* of Grimm and in manner the works of Perrault and Rabelais, is one of the most popular books of its kind. It has been translated into various European languages and has been extensively imitated by such artists as Lippi, Salvator Rosa, Carlo Gozzi, and Wieland. Neglected by the author, *Lo cunto de li cunti* was much read in Italy in the seventeenth and eighteenth centuries and became universally famous through the criticism of Grimm and the translation of Liebrecht (1846). Much admired by Sir Walter Scott (1832), the tales have become familiar to English-speaking peoples in the translations of Keightley and Taylor and in the latest of R. Burton (London, 1893). Consult B. Croce, *Studi sulla letteratura italiana del Seicento* (Bari, 1911).

**BASIL'IAN ART.** See MONASTIC ART.

**BASILIAN ISLANDS.** A group of about 60 islands constituting a part of Mindanao, Philippines. They lie off the south coast of the peninsula of Zamboanga, are of volcanic and coral origin, and have a total land area of about 350 square miles. The population is estimated at about 8000. Fishing and a little weaving are the principal occupations. Fruit, sugar, grains, hemp, cotton, tobacco, and fine timber grow. The capital, Isabella, is on the northwest shore of Basilian Island and is about 575 miles from Manila.

**BASILIAN MONKS, or MONKS OF SAINT BA'SIL.** An order founded by St. Basil, Bishop of Cæsarea, in 358; it grew to large numbers before the death of the founder (379). The greater portion of the monks of the Greek church are of the order. In the Western church Basilian monasteries existed, and the order became strong after the Reformation in Spain and Italy. A modern Basilian order, founded in France in 1822, devoted to education, has colleges in Canada and the United States. There are also Basilian nuns, who call Macrina, the sister of Basil, their founder. The records of the order show that it furnished 14 popes, many cardinals, and nearly 12,000 martyrs. The rule of Basil is the foundation of that of Benedict, the great founder of Western monasticism.

**BASIL'ICA** (Lat. from Gk. *βασιλική, basilikē*, royal, scil. *στοά, stoa*, porch). The large colonnaded building used by the Romans for the transaction of business and legal affairs; also the common type of the early Christian churches. The name is derived from the *stoa Basileios*, or king's portico, at Athens. Vitruvius (q.v.) says: "Basilicas ought to be built in the warmest quarters of the market places, in order that, in winter, the merchants assembling there may not be inconvenienced by bad weather"; and elsewhere he speaks of the tribunal projected like a hemicycle from the main building, so "that those who stand near the magistrates may not be disturbed by those doing business in the basilica." These buildings varied in proportions and arrangement. Vitruvius, who built one himself at Fanum, says that they should be oblong, their width being between one-third and one-half of their length, and divided into three parts by two rows of columns, the central part being three times as wide as the two sides, which are called porticoes. A second story is made over the porticoes by a second series of shorter columns forming a gallery with a marble parapet, which usually extends also across the short ends and was used for promenaders and spectators. At one of the short ends a tribunal projects in the form of a semicircular or square apse. Here sits the judge, or prætor, surrounded by his assessors or jurymen; it is often partly screened off from the main body of the building by smaller columns and is on a higher level. On either side of it is a small room connected with it—cabinet or robing room. There are many variations from the three-aisled type described by Vitruvius. Some are halls with a single nave, without porticoes or galleries, as at Aquino and Palestrina; others—and these the most splendid—have as many as five aisles, with four rows of columns; e.g., the Basilicas Julia and Ulpia; others have two hemicycles, one at each end, as Trajan's Basilica Ulpia; others are virtually

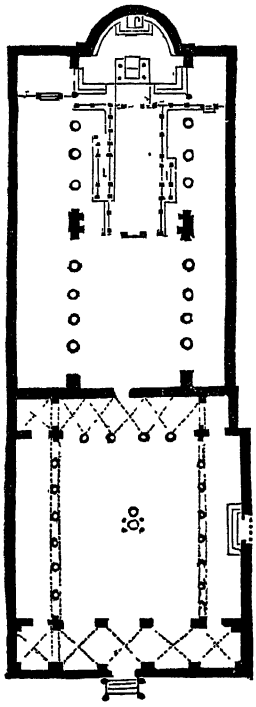


PLAN OF THE OLD BASILICA OF ST. PETER AT ROME.

square in form, as at Otricoli; others—and these are the majority—have no upper galleries; others, finally, have heavy piers and vaults in place of colonnades and wooden roof, as the colossal Basilica of Constantine. The tribunal end appears to have had a solid wall, but on the other three sides the building was often open, with either a simple colonnade (Ulpia) or a mixed arcade with engaged columns and entablature (Julia) such as we are familiar with in the Coliseum. Some, however, were inclosed by walls on three sides, as the Ulpian, or on all sides, as at Pompeii. For 500 years the Romans built basilicas (c.200 B.C. to 300 A.D.) as one of their most characteristic and sumptuous monumental expressions, alongside of their memorial arches, aqueducts, and *thermæ*. Until 184 B.C. their commercial and judicial business had been mostly transacted in the open forum. But in that year the Basilica Porcia was built (burned in 52 B.C.); in 179 the Fulvia; in 169 the Sempronia; in 121 the Opimia; in 46 the Julia. Pliny calls the Æmilia and the Julia two of the four most superb monuments of Rome. They flanked the Forum on opposite sides, and their ruins have recently been studied with great care. Everywhere that Roman colonies were established under the late republic and the Empire basilicas were built in connection with the forums. They were the necessary outward sign of the Roman law, the seat of justice as well as of trade. The earliest basilica in good preservation is that at Pompeii, which has excited the greater interest because it may represent the original Greek type; it has an open porch, five doors, three aisles, a portico across both ends, and a well-preserved, raised, oblong tribunal at one end. Other examples exist: in the Orient, at Palmyra; in Germany, at Treves. In Rome itself the two most famous examples built under the Empire were the Ulpia, erected by Trajan in his forum, and that begun by Maxentius and finished by Constantine, unique for its immense vaulting of tunnel and groin vaults; for all other known basilicas appear to have had wooden roofs except the Ulpian, whose roof was of bronze. It is a common error to suppose that they were roofed only over their side aisles or porticoes with the central space open to the sky; this may, however, have been the case at Pompeii.

The Roman public basilica was therefore a sort of covered forum. The term was, however, extended to other colonnaded halls and porticoes of similar plan, but connected with theatres, baths, temples, and even palaces and villas. The largest room in sumptuous houses, with a higher roofed central section with windows and two rows of columns forming lower side aisles (as in Domitian's palace on the Palatine), frequently served wealthy converts to Christianity in the earliest times as a place of worship.

As the only type of covered structure suitable for large gatherings, it was natural that both the type and the name of the basilica should be adopted for Christian churches. The arrangements suited the requirements of the Christian liturgy. The hemicycle became the apse; the bishop and presbyters sat upon the bema, where the judge and his assessors had been; in place of the altar of a pagan god, the tomb of a martyr or saint stood in front of the bema; the congregation could conveniently be arranged along the side porticoes or aisles—men on one side, women on the other (or, in the East, men below and women in the galleries). The main change at first was the omission of the cross colonnades across the short ends. Later an atrium (q.v.) was often added at the front, and in some cases a transverse hall or arm intersected the nave in front of the bema (q.v.) or apse. The most splendid examples of the early basilican type of church were the three vast five-aisled basilicas of the fourth century in Rome dedicated respectively to St. Peter, St. Paul (outside the walls), and St. John (at the Lateran), of these the first was demolished (see ST. PETER'S); the second, burned in 1823, has been reconstructed with great splendor; the third, though standing, has been completely transformed by successive remodelings. The most perfect of early Christian basilicas extant in Rome is that of Santa Maria Maggiore, built in 432 and but little altered. The older (sixth century) portion of San Lorenzo, in two stories, shows the mediæval practice of piecing together unrelated members torn from pagan temples and ruins. The basilica of San Clemente (1096–1108) with a fine atrium, alone preserves the mediæval arrangements and furnishings of the choir, ambones, ciborium, and apse (see these terms respectively). In Italy the primitive type was preserved as late as the twelfth and thirteenth centuries in certain provinces, especially around Rome and in Tuscany, with its oblong plan; two (or four) rows of columns (or very seldom square piers) dividing the nave from the aisles and supporting sometimes a straight architrave; sometimes a row of narrow arches; and thin walls supporting only wooden roofs, with the rafters and frame showing. Sometimes there was a narthex or portico at the entrance, and at the opposite end, in the largest basilicas, a cross-nave intervened in front of the apse, in the centre of which stood the altar. Marble incrustations, mosaic pictures and emblems, and inlaid pavements adorned the finer basilicas. The early basilicas had but a single apse, but by the sixth century a smaller apse was often added on either side, developed from the two side chambers of the ancient basilica, which had become sacristy and treasury in the earliest churches. Until the sixth century the basilican form ruled everywhere; then the Orient adopted Byzantine models, employing the dome, while in the north of Italy in the tenth century under Lombard influence, and later in western Europe generally, the scarcity of antique columns ready-made and of marble, the substitution of heavy clustered piers, large arches, and thick walls for the



PLAN OF BASILICA OF SAN CLEMENTE AT ROME. THE ONLY SURVIVING BASILICA WITH AN ATRIUM.

serried columns, small arches and thin walls of the basilican type of church, and, above all, the introduction and development of vaulting, completely transformed the aspect of the churches, to which one can no longer apply the adjective "basilican," although they still retain the fundamental elements of the basilica plan. (See ROMANESQUE ARCHITECTURE.) Besides the important basilicas already mentioned one may note from the early period Santa Sabina and Sant' Agnese at Rome; Church of the Nativity at Bethlehem; Sant' Apollinare Nuovo, Sant' Apollinare in Classe, San Francesco, and San Vittore at Ravenna; St. John at Constantinople; St. Demetrius at Salonica, the Crocifisso at Spoleto; the cathedrals at Parenzo, Triest, and Grado. In central Syria, where there are remarkable ruined Christian towns deserted ever since the Mohammedan invasion in the seventh century, there are important basilicas at Shakka, Tafka, Sueideh, Kerbet-Hass, Rueiha, Der-Seta, Bakuza, Kalb-Luzeh, Turmanin, Kalat-Seman, etc. Of later date are the following at Rome: San Giorgio in Velabro (682), Santa Prassede (ninth century), Santa Maria in Trastevere and the nave of San Lorenzo (twelfth century); and elsewhere San Miniato at Florence, cathedrals at Torcello and Murano, and two churches at Toscanella, besides many others which combine basilican and Romanesque elements in varying degrees. See CHURCH; Plate of PAESTUM.

**BASILICA** (Gk. neut. pl. of *βασιλικός, basilikos,* royal). A legal code published by Leo VI of the Byzantine Empire at the close of the ninth or the beginning of the tenth century. Its name is equivalent, in the opinion of some, to imperial law; but others think it was given in honor of Basil, the father of Leo, who began the work. It was composed of 60 books. The materials used were Greek translations of the *Corpus Juris Civilis* of Justinian, commentaries on the *Corpus,* and some later laws. In it the influence of Christianity is very marked, especially with regard to family relations. The best edition is Heimbach: *Basilicorum Libri LX Gr. et Lat.* (6 vols., Leipzig, 1833–70), completed by Zachariæ von Lingenthal, who published the *Prolegomena* in 1846 and a supplement in 1870. But only about two-thirds of the whole work are extant. Consult Heimbach, "Griechisch-römisches Recht," in Ersch und Gruber, *Encyklopädie,* part lxxxvi, and Mortreuil, *Histoire du droit byzantin* (3 vols., Paris, 1843–47).

**BASILICA ÆMIL'IA.** The finest basilica of Rome, built by L. Æmilius Paulus in 54 B.C. at a cost of $2,400,000, supplied by Cæsar, for the purpose of enlarging the Forum. It stood on the north side of the Forum near the Curia, or Senate House. After a fire it was restored in 14 B.C. at the expense of Augustus, and adorned with splendid columns of Phrygian marble, which were later set up in St. Paul's without the Walls and destroyed by fire in 1823. Within the last 10 years much of the building has been excavated (consult Hülsen-Carter, *The Roman Forum,* Rome, 1906). The building whose ruins are now visible was on the site of an older structure, known as the Basilica Fulvia et Æmilia, begun in 179 B.C., by M. Fulvius Nobilior and M. Æmilius Lepidus.

**BASILICA JU'LIA.** A great basilica on the south side of the Roman Forum, begun by Julius Cæsar in 54 B.C., and opened after the battle of Thapsus in 46 B.C. It was several times destroyed by fire and rebuilt. Its walls were of solid marble, and the pilasters which divided its nave and four aisles were of travertine sheathed with marble. The eastern end is crossed by the Cloaca Maxima. In the Basilica Julia the sessions of the Court of the Centumviri (q.v.) were held. In the sixth century the western vestibule was made into the church of Santa Maria de Foro; in the eleventh, rope makers took possession of it; and in the fifteenth century it was given over to lime burners, who set up in it their kilns and turned its marbles into lime. Later, it was used as a hospital burying ground, which covered its surface with a layer of human bones 6 to 8 feet deep. The basilica, like other buildings, has from time to time been despoiled of its materials, which have been used in the construction of other edifices, and the remains at the present time represent chiefly modern restorations. Consult Hülsen-Carter, *The Roman Forum* (Rome, 1906).

**BASILICA OF CON'STANTINE.** See CONSTANTINE, BASILICA OF.

**BASILICA PORCIA,** pôr'shĭ-â. See BASILICA, 1.

**BASILICA UL'PIA.** See BASILICA, 1.

**BASIL'ICON** (Lat. from Gk. *βασιλικόν, basilikon,* a black plaster, properly neut. of *βασιλικός, basilikos,* royal, i.e., of great virtue). A name given to an ointment composed of yellow wax, black pitch, resin, and olive oil or lard. The ointment has also been called *unguentum tetrapharmacum* (from the Gk. *τέτταρα φάρμακα, tettara pharmaka,* i.e., four drugs). Basilicon ointment, or resin cerate, as it is otherwise known, is used as a gently stimulant application to ulcers, burns, scalds, chilblains, and boils.

**BASIL'ICON DO'RON** (Gk. *βασιλικὸν δῶρον, basilikon dōron,* royal gift). The title of a treatise written by James VI of Scotland (afterward James I of England) for the instruction of his eldest son, Prince Henry, who died before his father. It was first printed in 1599. The work is divided into three books, which treat severally of a king's duty toward God, his duty in his office, and his duty in indifferent things. In the first book is laid down the divine right of kings, a doctrine whose practical application proved so disastrous to the Stuarts.

**BASILIDES,** bās'ĭ-lĭ'dez (Gk. *Βασιλείδης, Basileidēs*). A famous Gnostic Christian of Alexandria, who flourished during the reign of Hadrian (117–138 A.D.). Few details of his life are known. We are told, on doubtful authority, that he was a pupil of the heretical Menander at Antioch, and that he taught in Persia, where his dualistic system was later revived by Mani (see MANICHÆISM). Basilides himself claimed to be a follower of one Glaucias, "the interpreter of Peter," but no such person is known to us from any other source. The otherwise unknown prophecies of Barkabbas and Barkoph, to which Basilides refers, have been conjectured to be apocryphal Zoroastrian books. Basilides wrote a Gospel commentary, called the *Exegetica,* in 24 books. Origen speaks of a "Gospel according to Basilides," but it is improbable that Basilides did more than edit some kind of a gospel for the use of his followers. He shows some acquaintance with material included in our Matthew, Luke, and John. His son Isidore wrote several books, three of which are mentioned by Clement of Alexandria, and from others of the Basilidian school there come various incantations and odes. None of these writings are known to us except through opponents of the

movement. Agrippa Castor was one of the first to attack Basilides, but his book has perished. Irenæus, Clement of Alexandria, Hippolytus, and Origen discuss Basilides' doctrine at some length, but they do not agree in their accounts of what he taught. Following their divergent opinions, some modern scholars hold that Basilides constructed his system on Greek models, especially Aristotle; others, that he drew from the Orient, especially from the Persian dualism of Zoroaster. Criticism inclines at present towards the latter view.

Basilides' teaching should be studied in comparison with that of other Gnostics. (See GNOSTICISM.) He taught an elaborate cosmology, a system less perhaps like emanation than like evolution from the great Original. Basilides' system was not acceptable to the Church at large and was pronounced heretical. His followers, however, were quite numerous, and we hear of them as late as the fourth century, although they never attained any importance outside of Egypt. An illustration of how widely the Basilidians departed from the principles of their founder may be drawn from the fact that some of them practiced a gross licentiousness, while Basilides was inclined toward asceticism.

**Bibliography.** Uhlhorn, *Das basilidianische System* (Göttingen, 1855); Mansel, *Gnostic Heresies*, ed. Lightfoot (London, 1875); Hort "Basilides," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887); Schaff, *History of the Christian Church*, vol. ii, pp. 466–472 (New York, 1891). See GNOSTICISM.

**BASILIO DA GAMA,** bä-zēl'yō dä gä'mä, JOSÉ. See GAMA, JOSÉ BASILIO DA.

**BAS'ILIS'CUS** (Gk. Βασιλίσκος, *Basiliskos*). Emperor of the East from 476 to 477. He was brother-in-law of the Emperor Leo I. In 468 he had led the great African expedition against Genseric, the Vandal, which ended disastrously. His reign was uneventful. He was deposed by Zeno in 477 and died the following year.

**BASILISK,** băz'ĭ-lĭsk (Gk. βασιλίσκος, *basiliskos*, dimin. of βασιλεύς, *basileus*, king; Lat. *regulus*, little king; so named, according to Isidor, because it was the king of serpents, but perhaps by reason of the crest on its head). A fabulous creature, resembling a serpent, and supposed by the ancients to inhabit the Libyan Desert. It was described as being of a yellowish color, with spots of white, and as having a pointed head, whereon stood one or more prominences, also white, resembling a diadem. Its breath was considered to be especially poisonous and its glance fatal. The word *basilisk* is now applied to a sort of lizard, having an erectile crest along the middle of the back and tail and a dilatable pouch on the head.

**BASILIUS,** JOHANNES. See BESSARION, JOHANNES.

**BASIL'IUS VAL'ENTI'NUS.** See VALENTINUS, BASILIUS.

**BA'SIN** (OF. *bacin*, from LL. *bachinus*, from *bacca*, water vessel). In geology and hydrography, a depression of the earth's surface or of the strata constituting the crust of the earth; also the drainage area of a river system. Basins originate in several ways, and may be grouped under two general heads, those formed by crustal movements and those due to erosion. Most basins are due in part to both agencies. Basins formed by movements of the earth's crust are apt to be of great extent according as they owe their origin to either localized or continental movements. The Mississippi valley, previous to Tertiary time, was occupied by a shallow arm of the sea that covered the central portion of the North American continent. Elevation of the continent raised the district above sea level and drained the marine waters from the land, and orogenic movements partially surrounded it with mountains, with the result that an extensive interior basin was formed, the larger part of which is now drained by a single river system, that of the Mississippi. Other portions of the same basin are drained by the St. Lawrence River and by the rivers that flow into the Arctic Ocean. We have here an example of a geologic basin that contains several hydrographic basins.

The inclosed basins of Utah, Nevada, Arizona, and Mexico have been formed by local movements, folding, and faulting of the crust, that have culminated in the elevation of mountains inclosing plains. The elevation of the mountains has cut these plains off from the supply of moisture-laden winds, and arid desert conditions have largely ensued. During a former more humid period in Pliocene time great lakes occupied many of these basins, but their waters have disappeared largely through evaporation and lack of supply by rains, and concentrates of alkali, salt, and gypsum now cover large areas of their desert bottoms, while traces of their former shore lines are to be found far up on the mountain sides. See LAKE BONNEVILLE; LAKE LAHONTAN; GREAT SALT LAKE.

Another form of basin results when a section of the earth's crust subsides between two nearly parallel great faults or dislocations, to form what is known as a "rift valley." The most striking basins of this kind are found in western Asia and eastern Africa. The largest basin in this region begins north of the Dead Sea, and extends southward through the valleys of the Dead Sea, the river Jordan, and the Red Sea, whence the rift is continued in a southerly direction across Eritrea in Africa, to a point near Mount Kilimanjaro. This may be considered a continuous single depression or rift-valley basin, with a length of about 3500 miles and a maximum width at the Red Sea of 200 miles. Another such depression extends westward of the Victoria Nyanza for nearly 1500 miles in a general southerly direction and includes the valleys of the Albert Nyanza, Tanganyika, and Nyassa, terminating at the coast in the vicinity of the mouth of the Zambezi River. The amount of displacement of the bed of this latter rift has been enormous, the vertical throw of the faults having been at least 5000 feet in the vicinity of Lake Tanganyika. In volcanic regions basins filled by lakes often occur in the craters of extinct volcanoes. Crater Lake, in Oregon, is a good example.

In coal-mining regions the term "basin" is applied to synclinal depressions of the coal-bearing strata that have been produced by the folding of the beds incident to their elevation into mountains. Such a stratigraphic basin in the crust of the earth is not usually coextensive with a hydrographic basin on the surface, for the reason that synclinal depressions generally occupy ridges. The anticlinal upfolds have been worn away by weathering and are now replaced by valleys or hydrographic basins.

Basins formed by erosion are of two kinds, those formed by the work of rivers and those due to the wearing action of glacier ice. The former are the larger and more common, though the

latter often constitute prominent features of the landscape of northern countries. The basin of a river, when considered hydrographically, consists of the entire area drained by the main stream and its tributaries. This hydrographic basin may be in large part the result of orogenic movements; but its present boundaries have been determined entirely by the cutting power of its streams, and accordingly a hydrographic basin may consist of one or more geologic basins. The Hudson River system furnishes a good example of such a complex basin. The lower Hudson River, from New York City to Peekskill; the upper Hudson, from Peekskill to the Adirondacks; the Schroon River in the Adirondacks; the Mohawk River; the Schoharie, Esopus, and Catskill creeks, in the Catskill Mountains; and the Rondout in the Shawangunk Mountains—all drain distinct geological basins, the divides between which have been cut down by the rivers, till now the entire region is included in a single hydrographic system.

Glacial basins have been formed by the eroding power of ice acting on the floor and sides of valleys already formed by some other means. The basins usually hold lakes that form parts of river basins. Such are the "finger lakes" of central New York. Round lakes occupying shallow, bowl-shaped depressions on glaciated surfaces are common. A basin may also be formed when a landslide or moraine obstructs a valley. Such a basin and its contained lake is of an evanescent character, the extent of its duration depending upon the rate at which the overflow can cut down or remove the obstruction.

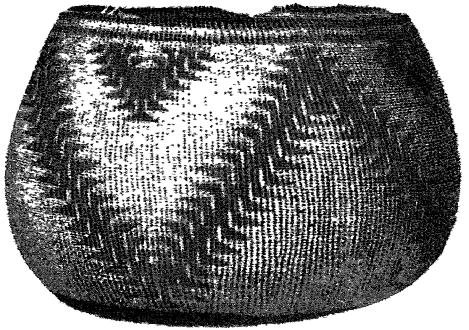
Basins tend in time to become shallower through the accumulation upon their floors of débris worn from the surrounding mountains. This process would, if continued without interruption, eventually fill the basin to its brim with deposits of gravel, sand, and silt, and a plain would result which, under conditions of sufficient moisture, would be of great fertility. Such waste-filled basins are common in the Pacific States. The discussion of the origin and characteristics of oceanic basins is reserved for the article on OCEAN. See also RIFT VALLEY; LAKE; RIVER; HYDROGRAPHY; PHYSIOGRAPHY.

**BASINGSTOKE**, bā'zĭng-stŏk (stock or place belonging to the Basings). A market town and railway junction in Hampshire, England, 48 miles by rail southwest of London, at the junction of five main roads from the south and west of England to the metropolis, and on the Basingstoke Canal, which connects it with the rivers Wey and Thames (Map: England, E 5). It has a handsome parish church, town hall, municipal corn exchange, and owns its water works, markets, and cemetery. The chief trade is in corn, malt, coal, and timber, and it has manufactures of agricultural implements, clothing, malt liquors, etc. In the neighborhood are the ruins of Basing House, belonging to the Marquis of Winchester, which withstood the forces of the Commonwealth for four years, but was at last taken by Cromwell and burned to the ground in 1645. Pop., 1891, 8200; 1901, 9800; 1911, 11,540.

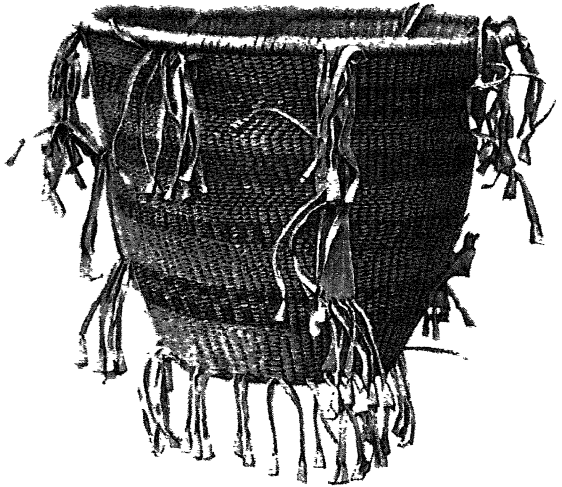
**BASKERVILLE**, JOHN (1706–75). A noted English printer, born at Wolverley, Worcestershire. Originally a footman, he afterward became successively a stonecutter and a writing master, and from 1740 manufactured japanned ware with much success at Birmingham. There, in 1750, he began costly experiments in type founding and, having obtained a satisfactory letter, published in 1757 his quarto *Vergil*, ranked by Dibdin (*Introduction to the Knowledge of Editions of the Greek and Latin Classics*, 1827) among the "most finished specimens of typography." In 1758 he was appointed for 10 years printer to the University of Cambridge, in which capacity he executed (1763) his famous edition of the Bible. From 1770 to 1773 he imprinted the splendid series of Latin classics. His type, not unqualifiedly praised by contemporaries, is now much admired. He manufactured his paper and devised a method of preparing a rich and uniform ink. Specimens of his work are now very scarce and valuable. Among his friends was Benjamin Franklin, with whom he corresponded regarding the sale of type-founding and printing establishments to the French government.

**BASKET** (Lat. *bascauda*, an article of furniture, made of basket work; probably of Celtic origin; cf. Welsh *basged*, *basgawd*). A vessel made of willow, thin strips of wood, reeds, grasses, or similar flexible materials woven together in a great variety of forms and used for many different purposes. Baskets have been in use from the very earliest times. The first mention of baskets in the Bible is in connection with the interpretation of Pharaoh's dreams by Joseph, and specimens of coiled basketry have been dug up from near Abydos in middle Egypt that are over 6000 years old. Remnants of baskets have been obtained from the Swiss lake dwellings, and similar finds are had from the remains of prehistoric peoples in America. There are two distinct types of technic in basketry: (1) *hand-woven* basketry which is built on a warp foundation, and (2) sewed or *coiled* basketry, which is built on a foundation of rods, splints, or straws. According to Mason, woven baskets are of (1) checkerwork—the warp and the weft having the same width, thickness, and pliability; (2) diagonal or twilled basketry—two or more weft strands over two or more warp strands; (3) wickerwork—inflexible warp; slender flexible weft; (4) wrapped weft, or single weft wrapped—the weft strand is wrapped, or makes a bight about the warp at each decussation, as in the Mohave *Kiho;* (5) twined or wattled basketry—weft of two or more elements. He divides coiled basketry into (1) coiled work without foundation; (2) simple interlocking coils; (3) single-rod foundation; (4) two-rod foundation; (5) rod and welt foundation; (6) two-rod and splint foundation; (7) three-rod foundation; (8) splint foundation (9) grass-coil foundation; (10) Fuegian coiled basketry. Basketry is studied from the point of view of materials. These naturally vary with the locality, for some plants are to be found only in certain localities; thus among the Chinese and Japanese bamboo is the chief stock used. Baskets are frequently ornamented with animal products, as fur and feathers, and sometimes with minerals. The manufacture involves the harvesting of the materials, their preparation, and the various processes of weaving, tools used, etc. The ornamentation is an important item, and the study of the symbolism shown in the designs is an important source of information, serving certainly in the United States as a key to Indian lore. Baskets are used in food, dress, house, furniture, arts, and industries, as expressions of æsthetic culture, in social customs, and religion. According to Mason, "from the cradle to the grave they are present." Their distribution is

# INDIAN BASKETS



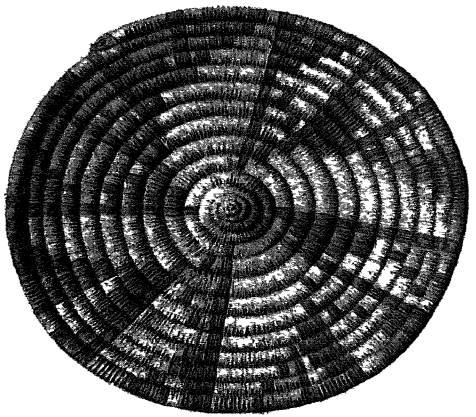
CALIFORNIA



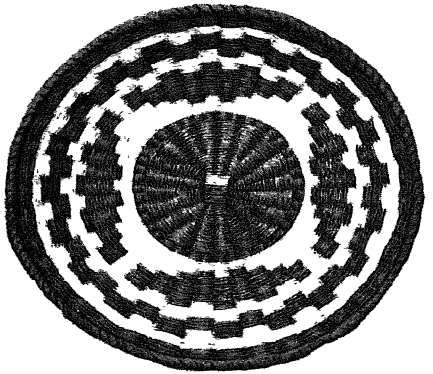
APACHE, ARIZONA



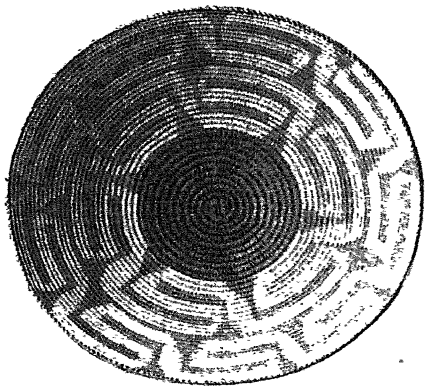
PIMA, ARIZONA



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HOPI, ARIZONA

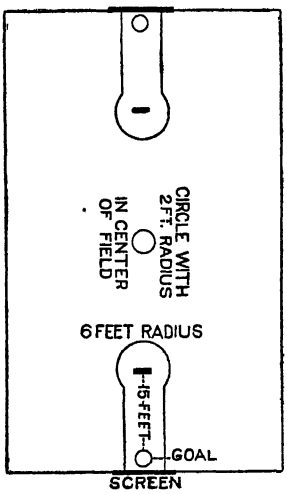


MARICOPA, ARIZONA

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world-wide, and they have developed wherever the environments furnished the necessary materials. In the eastern United States only traces of early basketry remain except perhaps in the beautiful Chetimacha specimens of Louisiana, but among the Western Indians, notably the Apaches, the art of basket making is still extensively practiced, and perhaps even more conspicuously among the Indians of the Pacific slope, yielding the Klikitat, Hupa, Pomo, and Tulare baskets. The great interest in the art of making baskets has in recent years led to their manufacture by amateurs, and the subject is now taught in most arts and crafts schools. Unfortunately not always wisely for aboriginal designs and forms tend under such circumstances to disappear and lose their original significance. The great museums of the world have collections of baskets, and in the United States those at the National Museum in Washington and in the American Museum of Natural History in New York are worthy of mention. There are also many private and special collections. For the ordinary commercial utensils of this kind the materials most extensively employed are thin split strips of ash and oak, willow and rattan. Consult *Directions for Collectors of American Basketry* (Washington, 1902) and *Aboriginal American Basketry: Studies in a Textile Art without Machinery* (1904), both by Otis T. Mason, and *Indian Basketry*, by George Wharton James (Pasadena, 1901).

**BASKET BALL.** A game that may be played on any ground or floor on which an oblong space not exceeding 4000 square feet can be marked. The goals, at each end of the floor or field, are hammock nets of cord, suspended from metal rings 18 inches in diameter (inside) at a height of 10 feet above the ground in the centre. The ball is a round, inflated bladder, covered with leather, from 30 to 32 inches in circumference, and weighing from 18 to 21 ounces. The game is played in halves of 20 minutes (actual play) between teams of 5 players each (a left and a right guard, a centre, and a left and a right forward). The teams change baskets at the end of the first half. The ball is put in play by being thrown by the referee into the centre of the field at right angles from the side lines and to a greater height than either of the centres can jump. The players who are to jump for the ball must keep their feet within the two-foot circle shown on the diagram. Each team endeavors to throw the ball into the basket of the other and to prevent its opponents from making a similar goal. The ball must be thrown, batted, or held with the hands only. It may not be kicked, punched or carried. Not more than one player on either side shall touch the ball at the same time. A player may not tackle, hold, push, shoulder, kick, or hack an opponent, and intentional roughness will disqualify. The penalty for these and other offenses gives the opposing team a free throw for the basket from a distance of not less than 15 feet. A goal so made counts one point; an ordinary goal from the field, two points. The foregoing are the principle regulations for the game as commonly played by men, though there are also Intercollegiate Rules, used chiefly by men, and Rules for Women (adopted in 1899) which provide for some modifications of the usual game.




The game is regulated by the Amateur Athletic Union, which has drawn up the official rules for its practice. It enjoys the unique distinction of having been invented by a single brain at one sitting. In 1891 a lecturer on psychology in the training school of the Young Men's Christian Association at Plainfield, Mass., speaking of the mental processes of invention, proposed the example of a game with its limitations and necessities. The same night, James Naismith, a member of the class, worked out basket ball as an ideal game to meet the hypothetical case; and the next day in the lecture room it was put in practice with the aid of the members of the gymnastic class. Thence it spread to other branches of the Young Men's Christian Association, and in two or three years to other athletic clubs and to the general public. Consult *Spalding's Official Basket Ball Guide for 1913–14* (New York, 1913); also Dudley and Kellor, *Athletic Games in the Education of Women* (New York, 1909), and Hill, *Athletic and Out-Door Sports for Women* (New York, 1903).

**BAS'KET FISH'.** A group of echinoderms of the same class (*Ophiuroida*) as brittle stars, but of the genus *Astrophyton*, characterized by dichotomously branched arms, in some species so numerously subdivided that when they are curled up the creature seems inclosed in a basket. The five-sided disk varies in size with age and species, but may be 3 inches broad, while the arms may be 10 to 15 inches in length. The upper side of the disk has 10 radial ribs, bearing short, blunt spines. The animal is wholly covered with an epidermis, granulated above, but smooth beneath, except that it seems to have a double line of stitches under each arm. The general color is light buff; but the interbrachial spaces in the living animal vary from dark purple to bright pink. The mouth is on the under side and central, and is set with spiniform bristles hiding numerous thorn-like teeth. From around the star-shaped mouth branch 5 stout arms, each of which is divided at the edge of the disk. Each of these 5 main branches is divided into two, making 10; each of the 10 is divided, making 20, and so indefinitely down to the least visible filament. An English naturalist counted 81,920 of these "small sprouts, twigs, or threads" in one species. On capture or disturbance the creature instantly folds its arms closely about its body, shrinking from the touch like a sensitive plant and assuming the basket shape from which it gets its familiar name. The attempt to untwist these coils generally ends in breaking the delicate but tenacious threads. The basket fish is probably a vegetable feeder, and its peculiar arms serve possibly for its protection from its enemies. The miscroscope shows each arm and spine to terminate in a minute but sharp hook. The animal, in moving, lifts itself on the extreme end of its long arms, standing as it were on tiptoe, so that "the ramifications form a kind of trellis work all around it reaching to the

ground, while the disk forms the roof." A number of species of basket fish are known; perhaps a dozen are valid. They are found in moderately deep water in most parts of the ocean, especially in the tropics, though the best-known species are of the north Atlantic. See BRITTLE STARS.

**BAS'KET WORM'.** See BAGWORM.

**BASK'ING FISH,** or **BASKING SHARK.** See SHARK.

**BASLE,** bäl. See BASEL.

**BASNAGE DE BEAUVAL,** bà'nàzh' de bō'vàl', JACQUES (1653–1723). A French statesman and writer on theology; the most distinguished of a French family known as supporters of the Protestant cause. In 1709 he settled as stipendiary minister of the Walloon church in The Hague, having gained the friendship of the Grand Pensionary, Heinsius. Here, while zealously discharging his religious duties, he was called upon to take an active part in state affairs, particularly in negotiating the defensive alliance concluded between France, England, and the States-General, Feb. 14, 1717. He died at The Hague, Dec. 22, 1723.

His chief works, which have been frequently laid under contribution without being named, are: *La communion sainte* (1688), a work approved even by Roman Catholics and often reprinted; *Traité de la conscience* (2 vols., 1696); *Histoire de l'Eglise* (2 vols. fo., 1699), in four parts, of which the fourth reprints his *Histoire de la religion des églises réformées* (2 vols., Rotterdam, 1690, 3d ed., 1725). It was a Protestant reply to Bossuet's *Variations of Protestantism,* to show that Protestantism is the true successor of the Apostolic Church; *Histoire des Juifs* (5 vols., 1706), one of Basnage's best productions and translated into English by Th. Taylor (1708); *Dissertation historique sur les duels et les ordres de chevalerie* (1720). Consult his *Life* by E. A. Mailhet (Geneva, 1881).

**BASOCHE.** See BAZOCHE.

**BASQUE,** bàsk (Fr. *Biscayan,* Lat. *Vascones,* whence Fr. *Gascons,* ML. *Biscaini, Busci,* Basque *Euskaldun* or *Eskalkun*). An isolated language of southern France and northern Spain, of entirely unknown affinities, spoken by about 440,000 persons. It is most plausibly supposed to be the sole representative of the ancient Iberian languages, which were superseded by Latin when the Romans conquered Spain and Gaul. In structure Basque belongs to the so-called polysynthetic or agglutinative type of languages, since it incorporates into the verb the pronominal elements for subject and object. In this respect it bears a marked resemblance to certain dialects of the Caucasian group and even to some North American Indian languages. All attempts to trace a real connection, however, between Caucasian and Basque have thus far proved unsuccessful, while parallels between Basque and American Indian are probably to be regarded merely as accidental coincidences. The late Georg von der Gabelentz sought to trace an affinity between Basque and the Berber dialects, but this theory also is open to grave doubts. It seems safest, in the present stage of linguistic knowledge, to regard this language as forming a family by itself.

Basque is divided into several dialects, of which the chief are those of Guipúzcoa, Biscay, Labourdin, and lower Navarre, all of which adopt the Roman alphabet, conforming their orthography to either the Spanish or the French, according to their position south or north of the Pyrenees. Basque words are accented, as a rule, on the final syllable, which ends in a vowel, or in *s, r, l, n,* and once in *t.* It possesses nouns, adjectives (which have no radical affinity with the nouns), pronouns, and verbs. Grammatical gender is lacking, while the verb, like the Germanic, has, properly speaking, but two tenses, present and past. The noun has two numbers and seven cases—nominative-accusative, instrumental, genitive, dative, locative, sociative (*gison-are-kin,* 'with the man'), and caritive (*gison-a-gabe,* 'without the man'). The article, originally, as in Indo-Germanic, a demonstrative, stands between the noun stem and the flectional ending (*gison-a,* 'the man'; genitive, *gison-ar-en;* dative, *gison-ar-i*). Similarly the adjective, which follows the noun, alone receives inflection (*ur garbi,* 'pure water'; genitive, *ur garbi-ar-en*). The Basque verb is either transitive, in which case the object can never be omitted, or intransitive, and both classes are strong or weak according to the absence or presence of the auxiliary verb. In the intransitive verb the subject precedes, while the order of the transitive is object, verb, subject (*h-a-bil,* 'thou goest'; but *h-a-kar-t,* 'thee bear I'). The substantial agent of a transitive verb is denoted by the instrumental (*gison-a-k yan du,* 'the man has eaten it'; literally, 'by the man was its eating'), forming a curious partial analogy to the usage in many modern Indo-Iranian languages as well as in the Australian dialect of Encounter Bay. In addition to the indicative mood the verb has an optative and an imperative. The rather meagre tense system of the Basque is supplemented by a future and a future perfect, nearer and remoter perfect, as well as pluperfect by analogical influence from the Romance languages, as *ibiliko n-ais,* which is almost exactly equivalent to the English *I have to be a-going,* or the French *irai,* 'I have to go,' from Lat. *ire habeo.* The numerical system, as in the Central American languages, is primarily vigesimal. Basque literature is not extensive and is mostly of a popular character, poems, quasi-dramatic compositions somewhat resembling the mystery plays of the Middle Ages, and the like, together with translations of religious literature. The oldest Basque book that we know, the *Linguæ vasconum Primitiæ,* is a collection of mediocre religious poems and love poems, and dates from 1545. The earliest-known Basque of distinction who wrote in his own language was Pedro de Axūlar, who flourished about the middle of the seventeenth century and wrote on religious subjects. Although it has adopted numerous loan words from French and Spanish, it has maintained its own remarkably against its Romance neighbors.

Consult: Müller, *Grundriss der Sprachwissenschaft,* vol. iii (Vienna, 1887), where an excellent summary of Basque grammar is given; Gerland, "Die Basken und die Iberer," in Gröber, *Grundris der romanischen Philologie,* vol. i (Strassburg, 1892–98; 2d revised and enlarged ed., Strassburg, 1904–06, with rich bibliography); Rev. Wentworth Webster, *Basque Legends, with an Essay on the Basque Language by M. Jul. Vinson* (London, 1877); Julien Vinson, *Le folk-lore du pays basque* ("Les littératures populaires de toutes les nations," vol. xv, Paris, 1883); Mahn, *Denkmäler der baskischen Sprache, mit einer Einleitung über das Studium derselben* (Berlin, 1857); De Azcue, *Euskal Izkendea; Gramática euskara formada y traducida* (Bilbao, 1891), Basque and Spanish; Van Eys, *Dictionnaire*

*basque-français* (Paris, 1873); Van Eys, *Grammaire comparée des dialectes basques* (Paris, 1879); Van Eys, *Outlines of Basque Grammar* (London, 1883); Vinson, *Essai sur la langue basque par François Ribáry, traduit du hongrois* (Paris, 1877); *Essai d'une bibliographie de la langue basque* (Paris, 1891); Campion, *Gramática de los cuatro dialectos de la lengua euskara* (Toulouse, 1884); Aizquibel, *Diccionario basco-español* (Toulouse, 1882–85); Larramendi, *Diccionario trilingue Castellano, Bascuence y Latin* (2d ed., 2 vols., San Sebastian, 1853); Michel, *Le pays basque, sa population, sa langue, ses mœurs, sa littérature et sa musique* (Paris, 1857); Linschmann and Schuchardt, *Leiçarraga's Baskische Bücher von 1571, Neues Testament, Kalender, und Abc, im genauen Abdruck* (Strassburg, 1900); Lewy d'Abartiague, *De l'origine des basques* (Paris, 1896, reprinted from *La Nouvelle Revue*, Dec. 15, 1895).

**BASQUE PROVINCES.** A division of northeast Spain, containing the provinces of Vizcaya (Biscay), Guipúzcoa, and Álava. The total area is 2739 square miles. The surface is very mountainous, particularly in the province of Álava, which is everywhere cut up into deep, narrow valleys by offsets from the main chain of mountains. The rivers of Vizcaya and Guipúzcoa empty, after a short course, into the Bay of Biscay; those of Álava flow down the opposite slopes into the Ebro, which carries their waters to the Mediterranean. The climate is, on the whole, mild and salubrious. The general aspect of the country is very picturesque, the hills in most cases being covered to the summit with forests of oak, beech, and chestnut. The soil in the valleys and plains, while not very rich, has been rendered productive by the energy of the people, although agricultural methods in the heart of the Basque Provinces are of the most primitive kind. The farms are small, usually of only about four or five acres, and rarely more than can be managed by the farmer and his family. The products are wine, barley, maize, flax, hemp, and some wheat. Iron is found in abundance (output, 1905, 5,302,344 tons, nearly all from Vizcaya); also copper and tin, marble, porphyry, and jasper. The sea fisheries are productive. *De facto* pop., 1900, 603,596; census of Dec. 31, 1910, 673,788 (*de jure*, 672,884). Consult Whiteway, "Customs of the Western Pyrenees," in *English Historical Review* (London, 1800), and Fabié, *Estudio sobre la organización y costumbres del país vascongado* (Madrid, 1897).

**BASQUE RACE.** The Basque race is of mixed physical type, with considerable variety in stature, color of hair, eyes, etc. Two types of skull are distinguished—brachycephalic or sub-brachycephalic, among the French Basques, and mesocephalic, or sub-dolichocephalic, among those of Spain. The Basque race is not confined to the Basque Provinces or to the southern side of the Pyrenees. On the French side of the Pyrences, three cantons of the department of Basses-Pyrénées, i.e., Labourd, Basse-Navarre, and Soule, are inhabited by Basques.

The Spanish Basques are a simple, brave, and independent people, willing to undergo any hardships rather than surrender their mountain freedom. No invader was ever able effectually to subdue or to expel them. The Basque Provinces retained, until 1876, a separate constitution guaranteeing them many political and fiscal privileges not possessed by the rest of Spain. (See FUERO.) But on the suppression of the Carlist insurrection, which had its stronghold in the Basque Provinces and in Navarre, the old immunities were abolished. The Basques are even prouder than the Spaniards, and the mere fact of being born in their territory secures the privilege of "universal nobility." *Escualdunac* is the name the Basques give themselves, a word which has been taken to mean either "eaters of acorns" or "dwellers in oak forests," but which signifies "those who speak *Eskuara*." Their country they call *Escualeria;* and their language, which is peculiarly their own, *Escuara*. The language has many dialects (as many as 25 have been noted by some authorities), but they can be grouped under three or four heads. The Basques are among the people to whom the curious custom of the "couvade" (q.v.) has been attributed.

The Basques are generally considered to be a variety of the Mediterranean branch of the white race, but their language is distinctly non-Aryan and forms an independent family of speech, no connection with any other tongue having yet been proved to exist. Finck, in his *Die Sprachstamme des Erdkreises* (Leipzig, 1909) voices a common opinion of ethnologists in stating (p. 43) that "Basque is the descendant of the ancient Iberian, or a dialect of it," but it has a considerably Aryan (French-Spanish-Latin) element. The relation of the Basques to ancient Iberian culture, and to the Celtic element in the Spanish Peninsula has not yet been determined.

There are at present about half a million Basques in Spain and France, three-fourths of whom are in the Basque Provinces. It is said that in addition to these some 200,000 Basques emigrated during the last half of the nineteenth century to South America, to which they have contributed a most desirable element in the population ever since the beginning of Spanish America, on account of their great bodily strength, good habits, and industry. Many eminent Spaniards have come from the Basque Provinces, the most noted being Ignatius Loyola and St. Francis Xavier. For a more particular account of the Basque race, consult: Vinson, *Les Basques et le pays basque* (Paris, 1882), the same writer's *Le folk-lore du pays basque* (Paris, 1883), and *Essai d'une bibliographie de la langue basque* (Paris, 1891); Collignon, *La race basque* (Paris, 1895); De Aranzadi, *El Pueblo Euskalduna* (San Sebastian, 1889), and other works; Webster, *Basque Legends* (1877); Marrast's edition of the Humboldt, *Recherche sur les inhabitants primitifs de l'Espagne* (Paris, 1866); Hübner, *Monumenta Linguæ Ibericæ* (Berlin, 1893); Michel, *Le pays basque* (Paris, 1857); and Baudrimont, *Histoire des Basques* (Paris, 1867). For a résumé and critique of the more recent literature on the Basque question, consult Schuchardt's article, "Zur gegenwärtige Lage der baskischer Studien," in *Anthropos* for 1911. On the archæological side consult also Siret's *Questions de chronologie et d'ethnographie ibériques* (Paris, 1913).

**BASRA,** bäs'rä, **BUSRA,** büs'rä, or **BASSORA,** bäs'so-rä (Pers. and Ar. *Basrah*, fortress). A town of Asiatic Turkey, the capital of the easternmost vilayet of the same name (area, 53,591 square miles; pop., 433,000), on the Ashar or Basra Creek, about 3 miles from its confluence with the Shat-el-Arab, 60 miles from the Persian Gulf (Map: Turkey in Asia, M 7). Situated at

the head of navigation, Basra is the centre of transhipment from river boats and caravans to ocean steamships and is therefore a place of great commercial importance. It is the port of Bagdad and has regular steamer communication with Europe and Indian ports. The chief imports from India are coffee, indigo, rice, wood, and drugs; and from Europe, and especially Great Britain, manufactured articles. The surrounding country is very fertile and yields vast quantities of fruit. This is one of the leading ports in the world for the export of dates, and upward of 60,000 tons are shipped annually. The town is surrounded by a wall in imperfect repair; its most notable buildings are two fine mosques and the tomb of Zobeir. It is a military station, with a dockyard and a factory, and is the seat of a British consul and of a United States consular agent. The consulates and mercantile establishments line the river bank in the Margil suburb. The climate is malarious and unhealthful, and the water supply bad. The population of Basra, which in the eighteenth century was estimated at 151,000, is now about 55,000, and consists chiefly of Arabs, a few Europeans and Indians, and some 3000 Persian merchants and employees, 2000 Jews, and 400 Armenians.

**BAS-RELIEF**, bä'rē-lēf' (Fr. low relief). See RELIEF SCULPTURE.

**BASS**, bās, or **BASE** (Fr. *bas*, fem. *basse*, It. *basso*, low, from LL. *bassus*, low, short). The deepest or lowest part in a musical composition and the deepest or lowest tone in a chord. It is next to the upper part in the independence and originality of the melodic design, and in respect to harmony it is the most important part, containing more frequently the fundamental notes of the chords; on it, moreover, is formed the effective musical figure known as organ point (q.v.). *Bass* or *basso*.—The lowest male voice, generally with a compass of F to d', all in the chest register (q.v.). Some exceptional voices have even a larger range, going down to C or $B_1$; these are called *basso profundo*. For origin of word, see ALTO. *Bass*.—The name of an old bow instrument with five or six strings, intermediate between the cello and double bass. In older scores the word "basses" or *bassi* refers to both cellos and contrabasses, for which only one part was written. In modern scores, where cellos and double basses generally have different parts, the word "basses" denotes double basses only. (See DOUBLE BASS.) *Basso ostinato*, or ground bass, is a figure of one, two, or four measures constantly repeated. *Basso continuo* means thorough or figured bass (q.v.). For bass clef, see MUSICAL NOTATION.

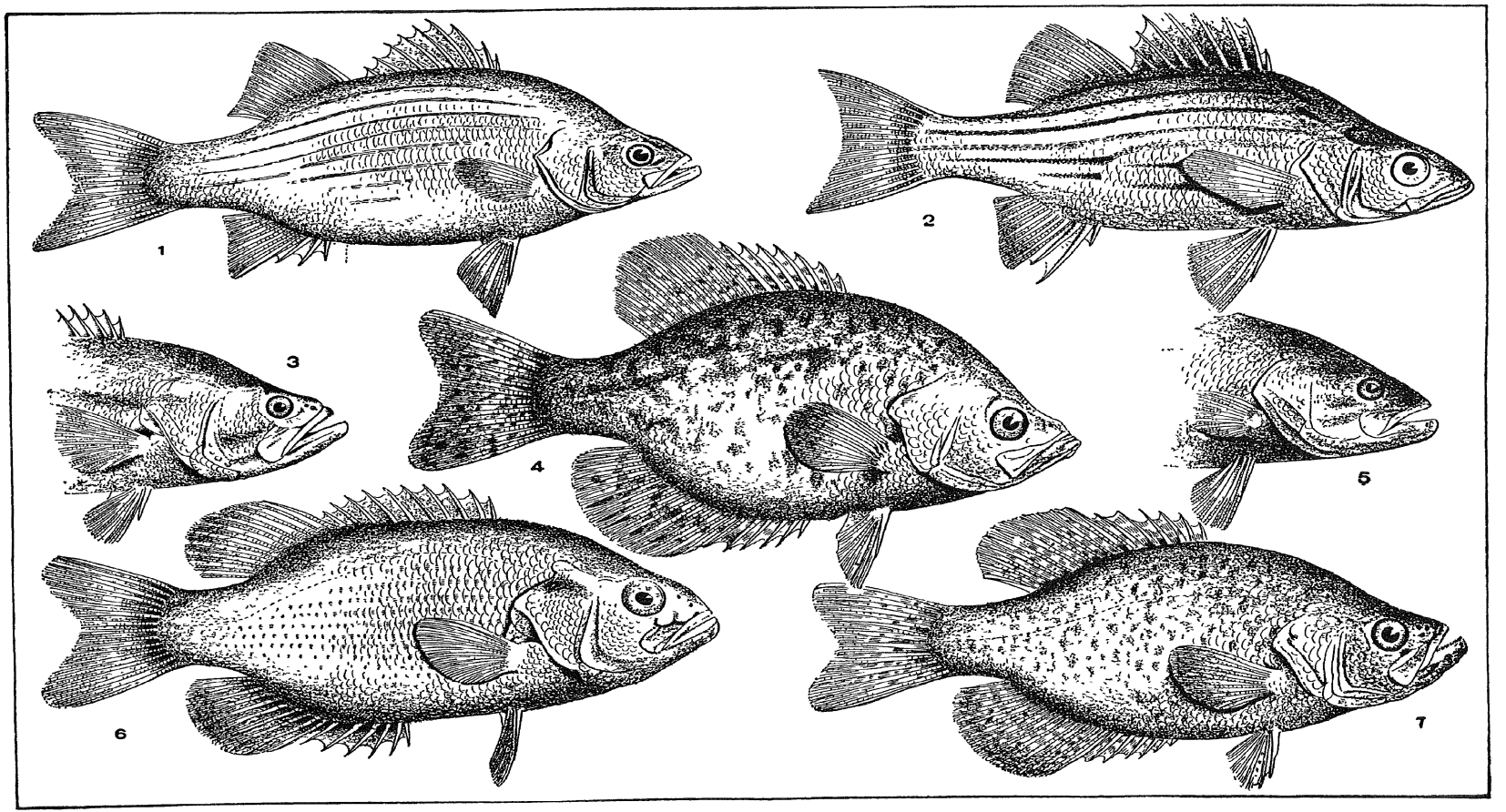
**BASS**, bās (originally *barse*, AS. *baers*, the perch). The name of many fishes, chiefly and most correctly applied to those of the perciform families Serranidæ and Centrarchidæ. The former family include the *Salt-water Bass*, represented typically in Europe by the sea perch (*Morone labrax*, formerly called *Labrax lupus*), to which the old English name "basse" was first applied. This is common in the Mediterranean and in British and Dutch waters, swimming in shoals and entering estuaries and streams to spawn. It may reach 2½ feet in length and is highly esteemed as food. The nearly related American striped bass, or rockfish, *Morone lineata* (see Colored Plate accompanying TROUT), often reaches a weight of 30 to 90 pounds, is distributed along the entire east coast of the United States, ascending at times 30 to 50 miles above the tide-water line, is very abundant, and enters rivers in the spring to spawn. It is one of the most important American food-fishes, and has been introduced by the United States Fish Commission to the Pacific coast, where it has now become numerous and valuable. Angling for this fish is one of the foremost sports along the eastern coast as far north as the Bay of Fundy, where they congregate in great numbers. Various methods are employed, as trolling, in Chesapeake Bay, etc.; but the customary method is to cast in the surf with a rod and reel, the former like a salmon rod, and the reel capable of holding 200 to 300 yards of line. The season is July, August, and September, when the fish approach close to the shore, schooling in the surf and entering bays and rivers. Hence such rocky shores as those from New York City to Cape Cod are favorable; and the finest of sport is enjoyed from out-reaching rocks at the entrance of Buzzard's and Narragansett bays, where expensive stagings are often erected for convenience. Living bait of great variety is used, and very long and skillful casting is required, success being rewarded by an exciting tussle with this strong and spirited fish, calling for the highest skill. In the upper waters of the tidal rivers, when found resting below the rapids, it will take a gaudy fly very greedily and give fine sport.

The yellow bass (*Morone interrupta*) of the lower Mississippi valley, the white perch (*Morone Americana*) of the Atlantic coast (but also sometimes landlocked), and the white bass, or white perch (*Morone* or *Roccus chrysops*), of the Great Lakes and Mississippi valley, are all excellent food fishes and are true bass. Other marine fishes are sometimes styled bass, as the weak-fish and various relatives, which are "sea bass," one (*Cynoscion nobilis*) being the "white sea bass" of the Californian markets. In the Southern States the drum (Pogonias) is so known.

The *Fresh-water Bass* belong to the sunfish family, Centrarchidæ, and are prominently represented by the two black bass of sportsmen—the small-mouthed (*Micropterus dolomieu*) and the large-mouthed (*Micropterus salmoides*). In waters east of the Alleghenies they are imported fish, getting into the Hudson through the Erie Canal as early as 1825. They were first planted in the waters of eastern New York and the other Middle States nearly 50 years ago, a small quantity having been brought in 1853 from the Youghiogheny River and planted in the Baltimore and Ohio Canal, whence they found their way into the Potomac, Susquehanna, Delaware, and other rivers. The small-mouthed bass prefers clear, running streams, but the large-mouthed prefers quiet waters. The latter grows to a larger size, an extreme weight being 20 pounds, a not uncommon weight 6 to 10 pounds. Both are variable in color and highly esteemed for food, and both are among the best, if not the *very* best, game fish of the United States.

Special tackle has been developed for bass fishing, the fly rod being as light and comely as that for trout, though somewhat heavier tackle must be used on lakes than along streams, where a 7½-ounce rod 10 feet long suffices, with a fine line, very strong leaders, and hooks less than No. 2. The flies used are

# AMERICAN FRESH-WATER BASS




1 WHITE BASS (Roccus chrysops).
2. YELLOW BASS (Morone interrupta).
3 BIG-MOUTHED BLACK BASS (Micropterus salmoides).
4. CALICO BASS (Pomoxis sparoides)
5 SMALL-MOUTHED BLACK BASS (Micropterus dolomieu).
6 ROCK BASS (Ambloplites rupestris).
7 CRAPPIE (Pomoxis annularis).

larger than those for trout, brown, red, and black "hackles" being recommended for general use. A shorter and, by a trifle, heavier rod is used for minnow casting. The time for bass fishing in the Gulf States is in autumn and winter; in the Northern and Central States in May and June or in September and October.

Other species in this family are the rock bass or redeye (*Ambloplites rupestris*) and the calico or grass bass (*Pomoxis sparoides*), both good food fishes and much used in the Mississippi valley. Consult the bibliographies under ANGLING. See Plate of FRESH-WATER BASS and Colored Plate of TROUT; FISHERIES.

**BASS,** bȧs, EDWARD (1726–1803). The first Protestant Episcopal Bishop of Massachusetts, his native State. He graduated at Harvard in 1744, was ordained in England by Bishop Sherlock in 1752, and on his return became and remained through life rector of St. Paul's at Newburyport. In 1797 he was consecrated first Bishop of Massachusetts, his jurisdiction being afterward extended over New Hampshire and Rhode Island. Consult D. D. Addison, *Life and Times of Edward Bass* (Boston, 1897).

**BASS,** ROBERT PERKINS (1873– ). An American public official, born in Chicago. After graduating from Harvard in 1896, he studied for two years in the graduate and law schools of that university. He became interested in farming and in real estate, and devoted particular attention to the advancement of forestry in New Hampshire. Preceding his election in 1911 as Governor of New Hampshire, he had been for two years a member of the State Senate, and for four years before that a member of the State House of Representatives. During all this period he had been one of the leaders in opposition to the Republican "machine" in New Hampshire, and when he came to be chosen to the highest office in the State, it was on a platform that pledged him to carry out important legislative reforms. In a measure his efforts were successful. (See NEW HAMPSHIRE, *History.*) In 1912, however, he was not a candidate for reëlection on the Republican ticket, but left that party to head the Progressive movement in the State. Before the formation of a separate Progressive party he was one of the seven Governors who signed a petition to Theodore Roosevelt, asking the latter to become a candidate for the presidential nomination at the Republican Convention.

**BASSANIO,** bȧs-sȧ'nē-ō. Portia's lover in Shakespeare's *Merchant of Venice* (q.v.). He chose the leaden casket and won her for his wife.

**BASSANO,** bȧs-sȧ'nō (anciently *Bassanum*). A city in the province of Vicenza, north Italy, on the Brenta River, and the Padua-Bassano Railway, 30 miles north of Padua (Map: Italy, F 2). It has a castle and high walls and is picturesquely situated at the foot of the Alps. In the cathedral and the other churches and in the museum are paintings by J. Bassano; Canova's "Death of Socrates" is in the Villa Rezzonica. Bassano manufactures leather and majolica, has a great printing establishment, and there is an active commerce in silk, leather, oil, wine, and asparagus. In 1796 Bonaparte defeated the Austrians here. Pop., 1901 (commune), 15,443; 1911, 17,130.

**BASSANO.** A family of Italian painters, so called from their residence, a town near Vicenza; their real name was Da Ponte. FRANCESCO, founder of the family, was probably a pupil of Bartolommeo Montagna at Vicenza. The most prominent member of the family was his son and pupil JACOPO (Giacomo) DA PONTE (1510–92), who was, however, more influenced by his study of the works of Bonifazio and Titian at Venice. Practically all his life was spent in his native town, where he acquired much wealth, was accorded freedom from taxation, and even chosen chief magistrate (consul). After his return from Venice to Bassano he formed an individual style, suggested by his rustic environment, and became the founder of genre painting, properly so called, in Italy and Europe. His earliest works are of a conventional religious character, but by far the greater number of his latest and best productions are scenes from peasant life, often in beautiful landscapes. Under the guise of some scriptural title the sacred personages appear in these scenes as peasants. Assisted in patriarchal fashion by his four sons, he conducted an atelier the output of which was enormous. It is almost impossible to distinguish the authorship of most of these paintings; only the very best examples may be safely attributed to him. He also painted a few portraits. The most striking technical features of his painting are the bold play of light and the gem-like effect of his coloring. Two of his best works from scriptural subjects are in his native town; the museums of Vienna, Dresden, and Paris are particularly rich. A fine example, "Lazarus and Dives," belonging to Mr. Dan Fellows Platt of Englewood, N. J., was shown in the Metropolitan Museum of Art, New York City (1913). The painter had four sons, of whom the most noted were FRANCESCO (1545–97) and LEANDRO (1558–1623). Francesco's best-known work is a painting on the ceiling of the Ducal Palace, Venice, "The Capture of Pavia by Night." Consult Berenson, *Venetian Painters* (New York, 1894).

**BAS'SARIS,** or **BASARISK.** The Cacomistle (q.v.).

**BASS (bȧs) DRUM.** See DRUM.

**BASSEDAU,** JOHANN BERNHARD. See BASEDOW.

**BASSEIN,** bȧs-sān' (Hind. *Wassim*). A town in the presidency of Bombay, India, situated on an island of the same name, 28 miles north of the city of Bombay; lat. of island, 19° 20′ to 19° 28′ N. In 1720 the town had over 60,000 inhabitants, but through war, plague, and other causes has decayed until its population had dwindled to 9598 in 1911. It still exports considerable quantities of rice. In 1534 it was ceded to the Portuguese; in 1765, after a possession of 231 years, it was wrested from them by the Mahrattas; in 1780 it surrendered to the British after a siege of 12 days. The island contains about 35 square miles; it is separated from the continent by a narrow channel, which, as a shelter for shipping, constituted its value in the eyes of the Portuguese. Bassein is of historical interest, having been promised, though never delivered, as part of the dowry of Charles II's Portuguese consort.

**BASSEIN,** or **BASSIM.** The capital of the district of Bassein in lower Burma, on the left bank of a mouth of the Irrawaddy, 90 miles from the sea (Map: Burma, B 3). Its inland water connection and the opening of a railway in 1903 have enhanced its importance as a centre of commerce. The principal trade is in rice. The United States is represented by a consular

agent. The place is of military importance also, as it commands the navigation of the river. It was captured by the British in 1852. Pop., of town, 1901, 31,864; 1911, 37,081, area of district, 4127 square miles; pop., 1891, 311,260; 1901, 383,100; 1911, 440,988.

**BASSELIN,** bȧs'lăN', or **BACHELIN,** OLIVIER (c.1350–c.1419). A French poet, born in the Val-de-Vire, Normandy. Songs on convivial themes, ascribed to him, but now attributed to Jean le Houx (*Livre des chansons nouveaux et Vaux-de-Vire*, 1610 and 1858), are usually regarded as the origin of modern vaudeville. The song "To my Nose," celebrating its ruddy efflorescence, is the best known. Consult Gasté, *Etude sur Olivier Basselin et les compagnons du Vau de Vire* (Caen, 1866), and Gasté, *Olivier Basselin et le Vau de Vire* (Paris, 1887).

**BASSES-ALPES,** bȧs'alp'. A southeastern department of France, bordering on Italy (Map: France, S., L 4). It has an area of 2697 square miles; is mountainous, is watered by the Durance, and has much pasture land. The climate is severe, but the natural beauties attract visitors. The valleys are fertile, and much fruit is grown. Meagre transportation facilities hinder the development of manufacture and commerce. Pop., 1896, 116,028; 1906, 113,126; 1911, 107,231. Capital, Digne.

**BASSES-PYRÉNÉES,** bȧs'pē'rā'nā'. A southwestern department of France, bordering on Spain and the Bay of Biscay (Map: France, S., D 5). Area, 2978 square miles. The chief rivers are the Nive and the Odour. The southern part is wholly mountainous; the remainder is composed of wild heath land and fertile valleys. Agriculture, pasturing, lumbering, quarrying, and the manufacture of woolen goods, leather, paper, etc., are the leading industries. There is considerable domestic commerce, and export trade in minerals, lumber, wine, etc. A large part of this passes through Bayonne, the chief port. Pop., 1896, 421,955; 1906, 425,817; 1911, 433,318. Capital, Pau.

**BAS'SET,** or **BAS'SET HOUND.** See BADGER DOG; HOUND.

**BASSET,** RENÉ (1855– ). A French Orientalist, born at Lunéville. He studied in Paris at the School of Oriental Languages and in 1880 became professor of Arabic at the Ecole supérieure des Lettres in Algiers. Much of his work covers a study of the languages, history, archæology, geography, and folklore of the tribes living in the French possessions of Algeria and northwest Africa. His publications include: *Prière des mussulmans chinois, traduite sur l'original imprimé à Canton* (1878); *La poésie arabe antéislamique* (1880); *Etudes sur l'histoire d'Ethiopie* (1882); *Contes populaires berbères* (1887); *Nouveaux contes berbères* (1897); *Rapport sur les études berbères et haoussa* (1902); *Contes populaires d'Afrique* (1903). He also translated *Les Apocryphes éthiopiens* (1893–99) and was editor of the *Encyclopædie des Islam.*

**BASSETERRE,** bȧs'târ (Fr. lowland). The capital of the British West Indian island of St. Christopher, or St. Kitts, situated on the southwestern coast (Map: West Indies, G 3). It is well built and possesses several churches, a botanical garden, and a library. There are manufactories of sugar, and this commodity is the leading article of trade. Pop., 1901, 9962; 1911, 8200.

**BASSE-TERRE.** The capital and political centre of the French West Indian island of Guadaloupe, situated on the southwest coast, at the mouth of the Rivière-aux-Herbes (Map: West Indies, G 4). Its commercial importance is small because of an open harbor. Basse-Terre is the seat of a bishop, is well built, its streets are lighted by electricity, and it contains a number of fine public buildings. Pop., 1903, 7464.

**BAS'SETT,** JAMES (1834–1906). An American missionary, born near Hamilton, Ontario. He graduated in 1856 at Wabash College and in 1859 at Lane Theological Seminary, served as chaplain in 1862–63 in the Federal army, and from 1863 to 1871 held various pastorates. In 1871 he became a missionary for the Presbyterian Board and traveled widely throughout Europe, spending many years in Turkey and Persia, in which latter country he was a pioneer missionary worker. He is believed to have been the first American to penetrate as far east as the tomb of Harun al-Rashid at Meshed, eastern Khorasan. He founded the mission in eastern and central Persia, and did much to effect the appointment of a United States legation to Persia. His publications include: *Hymns in Persian* (1873); *Among the Turcomans* (1880); a translation into Gaghatti Tatar of the *Gospel According to Matthew; A Grammatical Note on the Simnuni Dialects of the Persian* (1884); *Persia, the Land of the Imâms* (1886).

**BASSETT,** JOHN SPENCER (1867– ). An American historian, born at Tarboro, N. C. He graduated at Trinity College, N. C., in 1888, was appointed professor of history there (1893), and in 1906 became professor of history at Smith College. His publications deal with the history of North Carolina, and include: "The Constitutional Beginnings of North Carolina 1663–1729" (1894); "Slavery and Servitude in the Colony of North Carolina" (1896); "Slavery in the State of North Carolina" (1899); "The Federalist System" (1905)—all included in the *Johns Hopkins University Studies in History and Political Science;* a *Life of Andrew Jackson* (1911); *A Short History of the United States* (1913).

**BASSI,** bȧs'sē, PADRE UGO (1800–49). An Italian priest and patriot, active in the revolutionary movement. He stirred up the people for the defense of Rome against the French and during the siege displayed great personal heroism. He was taken prisoner by the French (April 30, 1849), but soon released. When resistance proved hopeless, he accompanied Garibaldi, whose chaplain he had become, to Casena. Their ships were scattered, and Bassi fell into the hands of the Austrians, by whom he was taken to Bologna and after cruel tortures was shot. His last words were "God save Italy." Consult Zironi, *Vita del Padre Ugo Bassi* (Bologna, 1879), and F. Venosta, "Ugo Bassi, Martire di Bologna" in the *Pantheon dei Martiri Italiani* (Milan, 1863).

**BAS'SIA.** See BUTTER TREE.

**BASSIM.** See BASSEIN.

**BASSO,** bȧs'sō. See BASS.

**BASSOMPIERRE,** bȧ-soN'pyâr', FRANÇOIS DE (1579–1646). A marshal of France. He was born at Harouel, in Lorraine, and at an early age gained the favor of Henry IV, whom he resembled greatly in character. He fought in Savoy (1602), in Hungary (1603), at La Rochelle (1628), at the Pass of Susa (1629), and in Languedoc (1631). He was also sent on

diplomatic missions to Spain, to England, and to Switzerland. Made marshal in 1622, he awakened the suspicion and resentment of Richelieu, who, in 1631 caused him to be cast into the Bastille, from which he was not liberated until the death of Richelieu, in 1643. His *Memoirs* (Cologne, 1665), written in the Bastille, though unreliable in detail, provide a good reproduction of the society in which he lived.

**BĂSSOON'** (Fr. *basson*, It. *bassone*, from *basso*, low, called in Italian *fagotto*, bundle). A musical instrument of the double-reed variety, the bass of the wood-wind family of instruments. In 1539 Afranio, a canon of Ferrara, conceived the idea of bending double the long *bombardo* then in use, so as to make it easier for handling, hence the Italian name. It is made of maple wood or plane tree, with a long S-shaped metal mouthpiece, and is provided generally with 8 holes and 10 keys. Its enormous compass of 3 octaves, $B_1$ to $c^2$, contains 3 registers: the lower powerful, solemn, and majestic; the middle sweetly expressive, but weak; and the upper register sorrowful. In addition, it possesses certain tones that are comic to grotesqueness, as in the famous "honor" monologue in Verdi's *Falstaff*. These combined qualities make the bassoon one of the most serviceable and frequently employed of the wind instruments in an orchestra. The notes for the bassoon are written on the bass clef for the lower register and on the tenor clef for the higher. There are several sizes of bassoons, the most important among them the tenor bassoon, a fifth higher (now almost obsolete), and the double bassoon, an octave lower, than the ordinary bassoon. Bassoon is also the name of an organ stop the pipes of which are made to imitate the tones of the instrument. Consult Teuchert and Haupt, *Musikinstrumente in Wort und Bild* (Leipzig, 1911).

**BASSORA**, bȧs'so-rȧ. See BASRA.

**BASSO-RILIEVO**, bäs'sō rē-lyā'vō. See RELIEF SCULPTURE.

**BASS ROCK.** A rocky islet in the Firth of Forth, 1½ miles off the coast of Haddingtonshire, Scotland (Map: Scotland, F 3). It rises precipitously 320 feet above the sea and is about 1 mile in circumference. Of volcanic origin, and geologically interesting, its chief importance arises from its historical associations. As a fortress and state prison, the principal event in its history was the siege sustained by 24 of James II's supporters against the forces of William III during 1691–94, which ended in an honorable capitulation. It is the resort of innumerable flocks of sea fowl, especially solan geese, which form a profitable source of revenue. A lighthouse with a six-flash lantern of 39,000 candle power was established on the rock in 1902.

**BASS STRAIT.** The channel separating Tasmania from Australia (Map: Tasmania, C 1). It is about 185 miles long and from 80 to 150 miles broad and contains many small islands. The name of the strait is derived from that of Dr. George Bass, who first proved that Tasmania was an island by circumnavigating it in 1798.

**BASS** (bās) **TU'BA.** See TUBA.

**BASS'WOOD.** See LIME TREE.

**BAST** (origin obscure). An old term formerly applied to the fibrous tissue of the inner bark (q.v.), but now used as synonymous with "phloem" (q.v.). The vascular bundles of plants always include two regions, the "xylem" (wood) and the "phloem" (bast). In ordinary stems the vascular bundles form a cylinder, the xylem being the inner region of the cylinder and the phloem the outer region. The characteristic vessels of the xylem are the "tracheæ," through which the water ("sap") moves as it ascends the stem. The characteristic vessels of the phloem are the "sieve vessels," in which various foods of the plant are stored temporarily, being available for use at any time.

In stems that increase in diameter a "cambium" is formed between the xylem and phloem, a tissue which has the power of adding new tissue to the xylem and to the phloem. The new xylem is laid down in concentric rings ("annual rings"), thus increasing the diameter of the xylem cylinder. The new phloem is also laid down in concentric rings, but the older outer rings are pressed against the cortex by the increasing xylem, so that the older phloem becomes more or less disorganized. When the bark of such a stem is removed, it is peeled off down to the cambium, so that the innermost part of the bark consists of the removed phloem. It was to this phloem constituent of the bark that the term "bast" was originally applied, but, since it has become synonymous with "phloem," it applies wherever vascular bundles occur, as in stems without bark, veins of leaves, etc.

The principal bast fibres in commercial use are those derived from the flax, hemp, jute, ramie, or China grass, sunn hemp, and Cuba bast, or related species of *Hibiscus*. See FIBRE and the names just mentioned.

**BAST.** See BARK.

**BAS'TABLE**, CHARLES FRANCIS (1855– ). An Irish political economist, born at Charleville, Cork. He studied at Trinity College, Dublin, and in 1882 was appointed professor of political economy in Dublin University. In 1888–93, and 1897 he was an examiner for the University of London, and became in 1902 professor of jurisprudence and international law and in 1908 regius professor of law at Dublin. He wrote *The Commerce of Nations* (1892; 5th ed., 1911), *Public Finance* (1895), *The Theory of International Trade* (1897; 3d ed., 1903).

**BAS'TARD** (OF. *bastard*, Fr. *bâtard*, probably from LL. *bastum*, OF. *bast*, Fr. *bât*, pack saddle; equivalent to OF. *fils-de-bast*, son of a pack saddle, bastard, referring to the use of pack saddles as beds in taverns, by muleteers). An illegitimate child, one neither begotten nor born in lawful wedlock; specifically, one born of a spinster, of a widow whose husband has been dead such a length of time as to make it impossible for him to be the father, or of a married woman when proof positive is produced that the paternity is other than of the husband. Where the mother is married, the presumption of the law is exceedingly strong in favor of the legitimacy of the offspring. The old English law went so far as to make the presumption conclusive in case the husband was, at the presumed time of conception, "within the four seas" surrounding Great Britain. But illegitimacy may now be proved in England as well as in this country, by evidence establishing the fact beyond a reasonable doubt. Under the Roman or civil law, a child born before the marriage of its parents was legitimated by their subsequent marriage. This principle is followed in the law of those countries which were

grounded in the Roman rather than the English common law; viz., Scotland and the nations of the continent of Europe; and in Louisiana, the province of Quebec, and the states of Central and South America. In most of the United States the civil-law rule has been adopted by statute. The common law recognized no such principle, and it was expressly repudiated in the famous Statute of Merton, enacted by Parliament in 1235 (20 Hen. iii, chap. 9). The bishops having "instanted the lords that they would consent that all such as were born afore matrimony should be legitimate, as well as they that be born within matrimony, as to the succession of inheritance, forasmuch as the Church accepteth such for legitimate, . . . all the earls and barons with one voice answered that they would not change the laws of the realm which hitherto have been used and approved." This continues to be the English law, the only exception to it being the case of a *bastard eigné* (Old Law French), where a son born before marriage succeeded without opposition to the father's estate, although the latter had a legitimate heir; if the possession of the so-called *bastard eigné* was undisputed during his lifetime, and his legal heir claimed the estate, it was no bar to that claim to prove the bastardy of the father.

An illegitimate child is, in the old law phrase, *filius nullius*, the son of no one. His parents are not under any parental obligation to him, and it is only in the interests of the parish and at the instance of the authorities thereof that they can be compelled to support him. He has, at least under the common law, no legal name until by reputation he acquires one, and he has no right of inheritance as an heir. Furthermore his own heirs at law can be only those of direct descent from him. If he die intestate, leaving no children or grandchildren, his property will not by law become that of his father or mother, brother or sister, or uncle or aunt, but will escheat to the state, and in the United States may be claimed by the public administrator. But several of the States have by statute allowed an illegitimate child to inherit from his mother and in some cases his mother to inherit from him as heir or next of kin. The maintenance of an illegitimate child devolves by common law in the first instance upon his mother; but in order that the child may not be a burden on the public, statutes in England and similar enactments in all of the States in this country allow proceedings to be taken to compel the father to aid in supporting the child. This procedure is based, not on the theory that the child has a right to his support, but solely to prevent the burden of support from falling upon the parish or county. The usual practice in such a proceeding is for the alleged paternity to be established by direct evidence (the testimony of the mother being admitted as of strong, though not conclusive, weight), after which the putative father is called on to give bond to the magistrate or overseers of the poor to contribute a fixed sum for an agreed time to the support of the child. (See AFFILIATION.) The custody of the child belongs primarily to the mother, but the court may determine the time during which such custody may last. In all civil and criminal rights not connected with the law of inheritance, or of support from parents, the status of the bastard is the same as that of any other person. He may hold and dispose of real and personal property, may sue and be sued, may devise by will, and may claim the protection of the state in all respects as though he were legitimate. In questions of settlement arising under poor laws, it has been held that his legal domicile is that of the mother, not, as with legitimate children, of the father, until he attains a settlement of his own. It has also been held that the ordinary right of a father to appoint by will or deed a guardian for his minor child does not exist in the case of a bastard.

The term has not always been one of contempt and humiliation. William the Conqueror was not ashamed to sign himself "Guillaume Bastard"; and the title has been borne without reproach by many other characters famous in history, as Don John of Austria, and Dunois, "the Bastard of Orleans." Consult the *Commentaries* of Kent and Blackstone; also, Schouler, *Treatise on the Law of the Domestic Relations* (5th ed., Boston, 1895); Nicholls, *History of the English Poor Law*, vol. i (London, 1854). See ILLEGITIMACY; POOR LAWS.

**BASTARD BAR,** or **BAR SINISTER.** See HERALDRY.

**BASTARD OF ORLEANS.** See JEAN DUNOIS.

**BASTARD SAFFRON.** See SAFFLOWER.

**BASTIA,** bäs-tē'ä (It. fortress, bastion). The chief commercial town of the insular department of Corsica (Corse), France, on the east coast, opposite the Isle of Elba, 98 miles northeast of Ajaccio by rail (Map: France, S., M 6). Its streets are narrow and crooked, but its buildings are comparatively modern; it has two harbors, the new and the old, and a fine marine parade, adorned with a marble statue of Napoleon by Bartolini. The citadel and the cathedral of San Giovanni Batista are noteworthy. Its public institutions are a lyceum, a library with over 30,000 volumes, and fine collections of natural history. Wax candles, liqueurs, macaroni, tobacco, and soap are manufactured, and marble quarries, tanyards, and dye works give employment to many operatives. Bastia is an important trade centre and exports fruit, vegetables, minerals, and fish. The town is the seat of a United States consular agent. Bastia was built by the Genoese in 1380 and derives its name from the strong fortress or bastion which they built to protect it. After its cession to France in 1769 it became the capital, but in 1811 Ajaccio was selected in its place. Pop., 1901, 25,425; 1906, 27,338; 1911, 29,412.

**BASTIAN,** bäs'tē-an, ADOLF (1826–1905). A German traveler and anthropologist. He was born at Bremen, June 26, 1826, and was educated as a physician, studying at Berlin, Heidelberg, Prague, Jena, and Würzburg. His authority as an anthropologist rests upon an immense storehouse of facts, gathered during a series of extensive journeys in Asia, Africa, Australia, and America. In 1866 Bastian became docent at the University of Berlin and subsequently was made professor of ethnology. In 1869, with Virchow and R. Hartmann, he became editor of the *Zeitschrift für Ethnologie*, the organ of the Berlin Anthropological and Ethnological Society, of which he was one of the founders. He became in 1886 director of the new Museum für Völkerkunde. In 1901 he was editor of the *Ethnographisches Notizblatt*, published in Berlin. Bastian was a prolific writer, since 1859 having published nearly 60 works, comprising more than 80 volumes, dealing with various

subjects in anthropology. Within that province his range is extremely wide, his works embracing both ethnographic studies in the narrow sense as well as philosophic investigations in race and human psychology. A partial list of his works may serve to indicate the broad sweep of his acquirements in anthropology: *Der Mensch in der Geschichte* (3 vols., 1860); *Die Völker der östlichen Asien* (1866–71); *Das Bestandige in den Menschenrassen* (1868); *Beitrage zur vergleichenden Psychologie* (1868); *Ethnographische Forschungen* (2 vols., 1871–73); *Schöpfung oder Entstehung* (1875); *Die Vorgeschichte der Ethnologie* (1881); *Der Buddhismus in seiner Psychologie* (1882); *Amerikas Nordwestkuste* (1883); *Inselgruppen in Oceanien* (1883); *Indonesien* (1884–94); *Der Fetisch an der Kuste Guineas* (1884); *Die Seele indischer und hellenistischer Philosophie* (1886); *Ueber Klima und Acclimatisation* (1889); *Ideale Welten* (1893); *Vorgeschichtliche Schopfungslieder* (1893); *Ethnische Elementargedanken* (1895); *Die mikronesischen Kolonien* (1899–(1900); *Die Völkerkunde und der Völkerverkehr* (1900).

**BASTIAN,** băs'tyan, HENRY CHARLTON (1837–1915). An eminent English physiologist. He was admitted to the Royal College of Surgeons in 1860, was assistant curator in the Museum of the University College in London from 1860 to 1863; professor of pathological anatomy in the same college from 1867 to 1887; professor of principles and practice of medicine from 1887 to 1897; and physician to the University College Hospital from 1867 to 1897. In 1898 he was elected emeritus professor of the principles and practice of medicine at University College, London. He is recognized as an authority in the pathology of the nervous system and was one of the ablest defenders of the theory of spontaneous generation. He published: *The Modes of Origin of Lowest Organisms* (1871); *The Beginnings of Life* (1872); *The Brain as an Organ of the Mind* (1880); *Paralysis: Cerebral, Bulbar, and Spinal* (1886); *Various Forms of Hysterical or Functional Paralysis* (1893); *A Treatise on Aphasia and Other Speech Defects* (1898); *The Nature and Origin of Living Matter* (1905); *Evolution of Life* (1907); *Origin of Life* (1911).

**BASTIAT,** bà'styà', FRÉDÉRIC (1801–50). An eminent French political economist. He was born at Bayonne, June 20, 1801. His father was a merchant and educated his son with a view to the same pursuit. His first appearance as an author was in 1844, when he published, in the *Journal des Economistes*, an article entitled "De l'influence des tarifs français et anglais sur l'avenir des deux peuples." It contained in germ the theory of political economy subsequently developed by Bastiat, who from that moment was known as a decided opponent of the system of protection. Subsequently, in the same journal, he combated the economic fallacies of Socialism. During a visit to England he made the acquaintance of Cobden, and on his return to France he translated (1845) the speeches of the Free-Trade advocates, which he published in Paris with an introduction, entitled *Cobden et la ligue; ou l'agitation anglaise pour la liberté des échanges*, in which he presented a complete summary of the arguments against the protective system. Bastiat continued to propagate his views with considerable success. He became secretary of the societies and chief editor of the journal established to vindicate the principles of Free Trade. After the Revolution of 1848 he was elected successively a member of the Constituent and Legislative assemblies. In 1850 he came forward as the antagonist of the Socialist writer, Proudhon. Suffering from pulmonary disease, he repaired to Italy for change of climate, but died at Rome on Dec. 24, 1850. Besides the writings mentioned, Bastiat published *Sophismes économiques; Propriété et loi; Justice et fraternité; Protectionisme et communisme; Harmonies économiques;* and several other important treatises, all of which exhibit extensive knowledge of the subjects discussed, convincing logic, and a power of sprightly and biting satire. The *Harmonies économiques* and the *Sophismes* have been translated by J. P. Stirling. The fundamental thesis of Bastiat's system of economics is that unrestricted competition necessarily produces a universal harmony of interests. While the writings of Bastiat have had great influence, his main thesis has not found general acceptance. A new edition of his works in seven volumes was published at Paris in 1881. Consult Bondurand, *Frédéric Bastiat* (Paris, 1879), and Von Leesen, *Frédéric Bastiat* (Munich, 1904).

**BASTIDE,** bà'stēd', JULES (1800–79). A French publicist and politician, born in Paris. In 1821 he became one of the first members of the French Carbonari, and after the July Revolution he was conspicuous among the writers of the radical opposition. On the reconstruction of the National Guard he was elected commandant in chief of the legion of artillery and took part in the two insurrectionary movements, for the second of which—the *émeute* in Paris, June 5, 1832—he was condemned to death, but escaped to London. Pardoned in 1834, he returned to Paris and again devoted himself to politics, contributing articles to a daily journal, the *National*, of which he became editor in 1836. In 1847 he founded the *Revue Nationale*. He was one of the principal agitators in the Revolution of 1848 and became Minister of Foreign Affairs. After the coup d'état he withdrew from political life. He published: *De l'education publique en France* (1847); *La république française et l'Italie en 1848* (1858); *Histoire des guerres religieuses en France* (1859).

**BASTIEN-LEPAGE,** bàs'tyăN' le-pàzh', JULES (1848–84). A French painter. He was born of peasant stock at Damvillers, a village of Lorraine, Nov. 1, 1848. His early bent towards art was wisely fostered by his father. After graduating from the College of Verdun, he went to study in Paris in 1867. Here he was at first a student by day, and at night a postal agent, and then entered the class of Cabanel at the Ecole des Beaux-Arts. He was little influenced by this training, but more by the works of Manet (q.v.). The first of his pictures to command attention were in the Salon in 1874, where he exhibited "The Song of Spring" and a "Portrait of My Grandfather," which struck a new note in portraiture. It was painted *en plein air* and full of delicate outdoor light, very truly recorded. The attitude of the figure was unconventional; the model was in the act of snuff taking. This was the first of a series of triumphs, which brought him several medals, election to the Legion of Honor, and recognition in other countries; but he always remained a loyal son of his native village, where he painted the peasant scenes, which are his most ambitious

productions. Constantly in delicate health, he died of cancer of the stomach at Paris, Dec. 10, 1884, and was interred in the church of his native village. His last years were brightened by the friendship of his pupil Marie Bashkirtseff (q.v.), whose death preceded his by only one month. His chief canvases are "The Haymakers" (1878), in the Luxembourg (Paris); "The Potato Gatherers" (1879); "Joan of Arc Listening to the Voices" (1880), Metropolitan Museum of Art, New York. Mention should also be made of "The Beggar" (1881), "Love in a Village" (1883), and his last dated work, "The Forge" (1884). His numerous portraits are remarkable for strong characterization, attained through the closeness of their drawing. Among his notable subjects are Mme. Sarah Bernhardt, Albert Wolff, the Prince of Wales (Edward VII), and Gambetta on his deathbed. Bastien-Lepage was a thoroughgoing realist, whose art represents the application of the *plein air* methods of the Impressionists to figure and bust subjects. His color resembles theirs in its high scale, but he pays more attention to detail and lacks their facility. His pictures vary much in quality. Consult: Marie Bashkirtseff, *Journal intime* (Paris, 1890); the biographies by Theuriet (Paris, 1885), and De Fourcaud (ib., 1888); Arnie, *J. Bastien-Lepage, lettres et souvenirs* (Evreaux, 1896).

**BASTILLE,** bâs-tēl' (Fr. fortress, from OF. *bastir*, to build). A name originally applied in France to any building constructed of masonry, with towers or bastions adapted for defense. These fortresses were once very numerous, especially at Paris; but Cardinal Mazarin, as a part of his anti-feudal policy, allowed only a few of them to remain standing, among these being the Castle of Paris, to which the name Bastille was at last exclusively applied. This castle developed from two towers on either side of the road which entered Paris by the Faubourg Saint-Antoine. By the orders of Charles V Hugues Aubriot converted the towers into a castle of four bastions, connected by thick walls, the whole being surrounded by a moat 25 feet deep. The number of bastions was subsequently doubled, and the area of the whole correspondingly increased. The Bastille, from its commanding position, was closely connected with important affairs in French history and was occupied by the Guises in 1588, by Henry IV in 1594, the Frondeurs in 1649, and Condé in 1652. During its entire history it was utilized as a state prison, there being cells and dungeons for as many as 80 prisoners—a limit often reached. There was undoubtedly considerable severity exercised at different times, but whether the treatment there was any more strict than the customary prison discipline of the age, it is hard to determine. It seems established that many of the noble prisoners, at least, were treated with considerable lenity; but accounts of cruelty, some of which were probably well founded and others exaggerated, and the association of the Bastille with the use of the *lettres-de-cachet* (q.v.), which kept so many in confinement without trial, caused this prison to be regarded as the symbol of oppression. It was natural, therefore, that the Bastille should be one of the first objects of attack at the outbreak of the Revolution. On July 14, 1789, the populace of Paris, recruited chiefly from the Faubourg Saint-Antoine, attacked the fortress and stormed it after a half-hearted resistance by the Governor, De Launay, and a handful of Swiss. The Governor and seven of his men were killed, the archives of the prison scattered, and the prisoners, seven in number, were carried through the streets and hailed as victims of tyranny and martyrs in the people's cause. The building itself was torn down, and the key sent by Thomas Paine as a present to George Washington. The anniversary of the taking of the Bastille is celebrated every year as the national holiday of France. Its site is marked by a bronze column.

Consult: Arnold, *Histoire de la Bastille* (Paris, 1845–59); Bingham, *The Bastille* (London, 1888); Davenport, *History of the Bastille* (London, 1837); Funck-Brentano, *The Bastille*, (Eng. trans., New York, 1900). The documentary records which escaped destruction are contained and explained in Ravaisson, *Les archives de la Bastille* (6 vols., Paris, 1866–73).

**BAS'TINA'DO** (Sp. *bastonada*, Fr. *bastonnade*, from OF. *baston*, Fr. *bâton*, cudgel). The name given by Europeans to the punishment in use in the Orient, which consists in blows inflicted with a stick, generally upon the soles of the feet, but sometimes also upon the back.

**BAS'TION.** A tower or projecting portion of the walls of a fortification, and the most important part of the fortifications of the *enceinte* (q.v.). The rampart forming a bastion is constructed as if on four sides of a pentagon, two of which (called the *faces*) form an angle with the point toward the exterior; the other two sides (the *flanks*) connect the extremities of the faces with the adjacent curtains. The fifth (supposed) side of the bastion is left open, the intervening space being known as the *gorge*. The bastion system dates back to the first rude means used in fortification, which probably consisted of nothing more than simple inclosures, surrounded with palisades; a device still employed by the natives of semi-civilized states. High walls with breastwork or parapets undoubtedly followed, to enable the defenders to examine the surrounding country. The bastion as it is known to-day, however, is of Italian origin, the most ancient at present existing bearing the date of 1527 and being situated at Verona. Bastions are generally designated by numbers, as are also the guns and the fronts. The numbers are according to the fronts and begin with the first one to the right of the exit of the main gate and continue with the sun. The advantage thus afforded is that it enables any particular gun to be specified, even if its number be unknown. Thus, the first gun on the right face of the second bastion, etc.

The relation which bastions bear to the general system of attack and defense is noticed under FORTIFICATION, where is given the historical development of methods of defense, illustrations, and a list of works treating this subject.

**BASU'TOLAND.** A British South African dependency, situated between the Orange Free State, Natal, and the Cape province, covering an area of 11,716 square miles (Map: Cape Colony, J 7). It has an elevated surface and a very rich soil, being considered one of the best grain-producing countries in South Africa. The climate is considered the most healthful in that section of the Continent. The principal products are cereals and live animals. Minerals are supposed to exist, judging from some indications, but so far coal is the only one

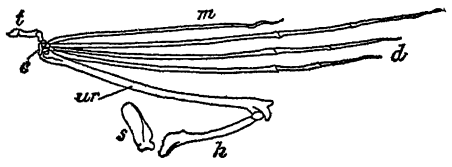
to be exploited. Basutoland is a member (since 1903) of the South African Customs Union. The imports consist chiefly of clothing and blankets, agricultural implements, metal products, and groceries. The imports and exports for the year 1908 amounted to £239,830 and £193,122 respectively. Basutoland is administered by a resident commissioner, under the High Commissioner for South Africa. It is divided into seven districts, subdivided into wards administered by hereditary chiefs. The administration of justice is also, to a very large extent, left in the hands of native judges. The revenue of the colony is derived chiefly from a native hut tax, license fees, post-office receipts, and an annual contribution from the Cape province. The revenue and expenditure for 1910–11 amounted to £145,500 and £134,888 respectively. Education is well advanced, and is carried on almost exclusively by missionaries. A railway from Maseru connects with the South African railway system.

The population of the colony was 404,507 in 1911. The natives (403,111) are a Bantu people, composed of several coalescent tribes, short in stature, regular in features, and with thinner lips than the Kaffirs, whom they resemble. They have advanced remarkably through the efforts of French missionaries and are becoming a civilized Christian nation, taking up readily modern ideas. Their language was reduced to writing by missionaries and forms a considerable literature. The capital of the colony is Maseru, with a population of about 861 natives and 500 whites. Basutoland was established as a separate state at the beginning of the nineteenth century by Moshesh, a powerful native chief, who clashed with the British government in 1852 and was worsted in the ensuing struggle. In 1856 a boundary dispute arose between the Basutos and the Orange Free State, which was continued for about two years without definite results. In 1866 a part of Basutoland was ceded to the Orange Free State, whose authority was recognized by the Basutos. But this settlement did not mark the termination of hostilities, which continued for several years. As the result of an appeal from the Basutos to Great Britain, Basutoland was annexed to Cape Colony in 1871. For the next 12 years the territory was in an almost uninterrupted state of rebellion, culminating in its disannexation from Cape Colony in 1884; since which time it has been administered under the direct authority of the crown. About four miles from Maseru a leper settlement was formed in 1912; the proportion of lepers in the territory is about .91 per thousand, and the disease is spreading. Consult: Mrs. Barkley, *Among Boers and Basutos* (London, 1900); Lagden, "Basutoland and the Basutos," in *Colonial Institute Journal*, vol. xxxviii (London, 1901); Bryce, *Impressions of South Africa* (London, 1899); Widdicombe, *Fourteen Years in Basutoland* (London, 1892); M. Martin, *Basutoland; Its Legends and Customs* (London, 1903); Lagden, *Basutos: the Mountaineers and their Country* (New York, 1910); Ellenberger, *History of the Basuto* (London, 1912).

**BAT** (OE. *back, balke;* cf. Swed. *natt-bakka*, nightjar, Dan. *aftenbakke*, evening bat, Icel. *lepr-blaka*, leather flapper, from *blaka*, flap, flutter). A small furry mammal of the order Chiroptera, having membranous wings and almost exclusively aërial in its habits. The power of flight, which resembles that of birds or insects, is the distinguishing feature of these animals, which in most other respects resemble the Insectivora. Their whole organization has been modified towards the perfection and the pursuit of an aërial life. Most of them are small, though a few are of considerable size, and have a spread of wings measuring 5 feet.

**Structure.** The vertebral column is short and compact, the thorax capacious, to make room for the proportionately very large heart and lungs, and the breastbone (which is keeled like that of birds) and shoulder girdle are very large and strong to afford attachment to the great muscles operating the wings; while the pelvic girdle is small and weak. Reversing the rule among mammals, the fore limbs are developed vastly in excess of the hind ones, which, although provided with perfectly formed feet, are practically useless for locomotion on the ground, though of service in climbing, and particularly in clinging to some support, from which the creature hangs head down when at rest—its customary attitude of repose. The bones of the limbs are permeated by medullary canals so large as to make them practically hollow; other bones are light and slender, and the ribs much flattened.

*Wings.*—The modifications of the limbs with reference to flight are very great (see illustration). The shoulder bones (clavicle and scapula)




SKELETON OF BAT'S WING.

*s*, scapula; *h*, humerus; *ur*, ulna-radius; *c*, carpus (wrist bones); *t*, thumb; *m*, metacarpal bones; *d*, digits (fingers).

are much enlarged and strengthened. The humerus (*h*), though long, is scarcely two-thirds as long as the forearm, where the radius (*ur*) is so lengthened that in some species it is as long as the head and body together (the ulna is rudimentary and firmly soldered to the radius); the wrist or carpal bones (*c*) are compact, and more or less soldered together at the radial joint; the metacarpals (*m*, equivalents of the bones of the "back" of the human hand) are prolonged to lengths varying in the different families, but always equaling or exceeding the length of the body, and terminate in fingers (*d*) consisting of a varying number of phalanges. An exception to this, however, is made by the thumb (*t*), which is very short, free from the wing membrane, and terminated by a strong claw greatly used by the animal in climbing or holding on to a support. Thus the length of the arm and hand may be 15 or 20 times as great as the breadth of the shoulder.

The position of the bones is changed, so that, while ability for a rotatory motion is lost, greater power for an up-and-down (i.e., dorsoventral) motion is gained. The hind limbs are also lengthened in the leg bones; but here the notable change is in the lateral position and spread gained through a twisting outward so extensive that the knee is directed backward in-

stead of forward. Upon this light, strong framework, moved and controlled by powerful pectoral muscles, is stretched a flexible, leathery, nearly hairless membrane (patagium), which is double and is really an extension of the skin. It envelops all the bones of the arm and hand and thence stretches to the hind leg (leaving the foot free) and in most families to, or nearly to, the end of the tail; but its relative size and shape vary. Stretching this great membrane and beating the air with it, the bat flies with more than the agility of a bird, though more slowly, and when it rests it folds the membrane somewhat like a fan against its sides, or wraps it about its body like a protecting mantle.

*Sense Organs.*—The brain and nervous system of bats are comparatively low in organization, but their sensory faculties are remarkably developed in adaptation to their crepuscular and nocturnal habits. "As blind as a bat" is a mistaken simile. All have efficient eyes, those of the Oriental fruit-eating sorts being of a size natural to their foxlike countenances. In our more familiar insect-eating species they are likely to be small, bead-like, and nearly hidden in the very soft fur with which these animals are clothed; the old English and German names, "flitting mice," were not bad ones. The senses of smell and taste are probably well developed. The sense of hearing is no doubt exceedingly acute and largely depended upon. All bats have prominent and very mobile ears, and in many of the insect eaters, the external ear expands in an enormous membrane, sometimes many times larger than the whole face, supplemented by appendages, ribbed, crinkled, and otherwise modified, and in some forms able to be folded down out of the way of harm. These expansive ears are evidently of more utility than simply to catch waves of sound and are related to the extraordinary sense of touch, which perhaps is carried to a higher degree of delicacy in these than in any other animals. In addition to them a large section of the order possesses "nose leaves"—more or less wrinkled and complicated upright growths of thin skin from the end of the nose, which often give to the face a most grotesque appearance. Two of the most extraordinary examples are shown on the accompanying Plate—the flower-nosed bat (Fig. 7), a native of the Solomon Islands; and Blainville's chin-leafed bat (Fig. 5) of South America. On the other hand, in some species such appendages are wholly absent, as in the ugly naked bat (Fig. 3) of the Malay countries.

All these membranes, as well as those of the wings, are filled with blood vessels and numerous ramifications of fine nerves, which take the form elsewhere seen in especially sensitive surfaces, and they are regarded as apprising the creature, in a way not fully understood, of the nearness of obstacles and giving other useful information. This was illustrated by the celebrated experiments of Spallanzani about 1775. He blinded bats with varnish and let them fly in a chamber filled with stretched and dangling strings. These and other obstacles they avoided; they turned corners, found holes for escape or concealment, and behaved as though eyesight were unnecessary; stoppage of the ears, however, caused them some embarrassment. Other observations have confirmed their ability, apparently through extreme sensitiveness of the exposed membranes, to sense objects without sight or actual touch.

**Distribution.** Bats are distributed in all parts of the world and, as might be expected from their powers of flight, inhabit many remote islands, such as Bermuda and New Zealand—the only indigenous mammals of the latter being two species of bats. They are absent, however, from the coldest parts of the world and are most numerous in the Eastern tropics, to which some groups are confined; in fact, the race is characteristically tropical. In rather cold climates, such as that of Canada, some species have acquired a habit of migration, going south to some extent in the autumn, as the northern winters are too long to be survived in a state of uninterrupted hibernation. This seems to be the case, according to Merriam, with two species of North American bats, both of which habitually rest in trees instead of in the warmer recesses of caves. The number of kinds of bats is so great that about 450 species are now recognized; and the enormous companies of certain species that congregate in favorable places are unrivaled elsewhere among gregarious mammals and recall the great flocks of sea birds to be seen in certain nesting localities.

**Ancestry.** Few fossil remains of bats are known. In the Upper Eocene deposits of Aix, France, has been found a well-developed bat's wing, and in other portions of the Tertiary deposits of the same country have been found skulls of species that very closely resemble those of modern forms. In North America their remains are known in fragmentary condition from the Eocene, Miocene, and Post-Tertiary deposits, and in South America they have been recognized in the cave deposits of Brazil. All these differ little from living genera.

**Classification and Habits.** Bats are classified as an order, divisible into two sections, Megachiroptera and Microchiroptera.

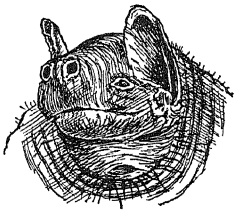
*Megachiroptera.*—These are lowest in rank and include the large-sized, fruit-eating species, mainly of the Oriental tropics. The lowest in rank are the fox bats or "flying foxes" of the family Pteropodidæ. They are described under the titles FOX BAT and FRUIT BAT.

*Microchiroptera.*—In this division are found all other bats—the ordinary bats of temperate climates as well as many tropical ones—which agree in being of small size, in living, as a rule, upon insects to which their dentition is suited, and in having more or less of a tail enveloped in an interfemoral membrane. The first family is that of the horseshoe bats (Rhinolophidæ), whose snouts bear such appendages as have been described, differing according to species. They are scattered throughout southern Asia, where many species are well known, and a few extend into Europe and the British Isles. Most of them are of the ordinary brown color, but an Australian species is bright orange in the male and yellow in the female. A family having still more prominent growths about the nose and ears is that of the leaf-nosed bats proper (Nycteridæ). Two genera inhabit eastern Asia, represented by the lyre bat (*Megaderma lyra*), whose vast ears are joined together above the head, and which sometimes attacks and kills other bats and small mammals and, according to good authority, frogs, sucking their blood. In the next family, Vespertilionidæ, are grouped the "true," or familiar, small, naked-faced bats of all countries. They feed almost exclusively on insects, which they capture in flight, and which their sharp and numerous teeth are fitted to hold and crush; they spend the hours of daylight in

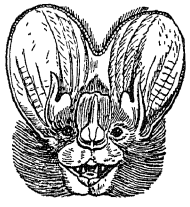
# BATS



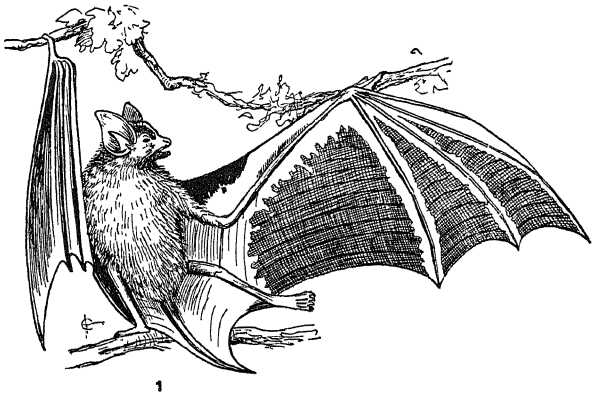
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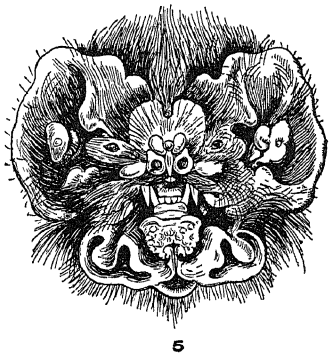
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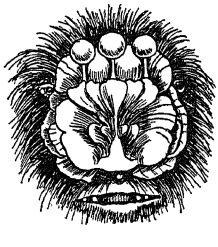


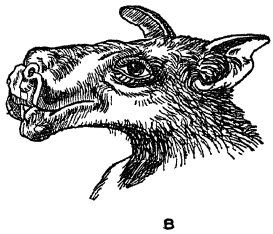
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1 A TYPICAL BAT, showing parachute.
2. TUBE-NOSED FRUIT BAT (Harpyia).
3. MALAYAN MASKED BAT (Cheiromeles torquatus).
4. INDIAN FALSE VAMPIRE (Megaderma lyra).
5. CHIN-LEAFED BAT (Mermops megalophylla).
6. AMERICAN FALSE VAMPIRE (Vampyrus spectrum).
7. FLOWER-NOSED BAT (Anthops ornatus).
8. HAMMERHEAD (Hypsignathus monstrosus).

eaves, ruins, hollow trees, garrets, and similar hiding places, sometimes resorting to caverns in vast numbers and so continuously that thick deposits of valuable guano are formed, as is the case in certain parts of Texas. At dusk they sally forth, alone or in pairs, and hunt the air for their minute prey. In cold climates they spend the winter hanging in some retreat (each species exercising a preference in this matter) in a semi-torpid state and occasionally appear during warm spells. One, or sometimes two, young are born in the spring, and carried about clinging to the mother's breast, where two nipples yield milk. The commonest European bats, in regard to which much folklore and no little of foolish superstition are related and still believed among the ignorant, are the long-eared (*Plecotus auritus*), the barbastelle (*Barbastellus communis* or *Synotus barbastellus*), the pipistrelle or flittermouse (*Vesperugo pipistrellus*), abundant all over Europe and Central Asia, and the serotine (*Vesperugo serotinus*), which is almost world-wide in its distribution. Here belong also the common North American bats, of which the most frequently seen in the northern United States are the little brown bat (*Vespertilio* [*or Myotis*] *subulatus*) and the red bat (*Lasiurus borealis*). All these have a long tail extending a spacious triangular membrane, which is further sustained by two bones springing from the "heels" of the hind feet, and which serves a most useful purpose in these dodgings through the air so characteristic of the bat's flight.

The remainder of the bats form the Emballonurine section of the group. The typical family, Emballonuridæ, consists of small tropical and subtropical species of both hemispheres, which have a naked muzzle, in which the nostrils project beyond the lower lip, and a tail sometimes longer than the interfemoral membrane. Many are South American. One section embraces the molossine, or mastiff bats, of which a sooty brown species dwells in southern California. They are noted for the thickness and freedom of the hind limbs and tail. Another family, the Phyllostomatidæ, is confined to Central and South America, where it represents the nose-leafed bats of the Old World, having many appendages about the nostrils. Many of them eat fruit or suck the blood of animals as well as feed upon insects, and one, called *Vampyrus spectrum*, is the largest and most repulsive of American bats; it is a fruit eater. (See Colored Plate of MAMMALIA and Plate of BATS.) Here, however, are classed the true vampires of the genus *Desmodus*. See VAMPIRE.

**Bibliography.** For the bats of the Old World, consult the standard works, and Dobson, *Catalogue of the Bats in the British Museum* (London, 1878); for North American species, Merriam, *Transactions, Linnæan Society of New York*, vol. i (New York, 1882); Allen, *Bats of North America*, Bulletin No. 43, U. S. National Museum (Washington, 1893); and the writings of Waterton, Gosse, Bates, Belt, Wallace, Poey, and Hudson for bats of tropical America. For the East Indian fruit bats, consult Wallace, *Malay Archipelago* (New York), and Blanford, *Fauna of British India: Mammals* (London, 1888–91); Miller, "The Families and Genera of Bats," U. S. Nat. Museum, *Bulletin* (Washington, 1907); Hahn, "Some Habits and Sensory Adaptations of Cave-Inhabiting Bats," in *Bulletin*, Marine Biological Laboratory, vol. xv (Lancaster, Pa., 1908). See FRUIT BAT; HAMMERHEAD BAT; HARPY BAT; LYRE BAT.

**BATABANÓ**, bä-tä'bä-nō'. A town of Cuba, situated in the province of Havana, on the south coast of the island, 37 miles by rail from Havana (Map: Cuba, C 4). This port is one at which coasting steamers touch, and is the nearest point in Cuba to the Isle of Pines. The natives are engaged in sponge fishing. Diego Valesquez in 1514 founded San Christóbal de la Habana on the present site of Batabanó. Pop., about 6500.

**BATAC**, bä-täk'. A town of Luzon, Philippines, the largest in the province of Ilocos Norte, 10 miles south of Laoag. It was founded in 1587 and is a flourishing trade centre. Pop., 1903, 19,524.

**BATAK**, bä'täk. A nomadic pygmy tribe living in the vicinity of Tinitian, Palawan Island. They are of lighter complexion than the Negrito and show other evidences of being mixed bloods. Although they sometimes practice agriculture in a crude fashion, they subsist chiefly on forest products and the game they are able to secure with their blowgun and poisoned darts. See PHILIPPINES.

**BATALEUR**, bä'tä'lēr'. See EAGLE.

**BATAN**, bä'tän. A town of Panay, Philippines, in the province of Capiz, 17 miles west of Capiz. Pop., 1903, 14,315.

**BATANÆA.** See BASHAN.

**BATANES**, bä-tä'näs. A Malayan people inhabiting the Batanes Islands, which lie between Luzon and Formosa. Their dialects belong to the Philippine group of languages. See PHILIPPINES.

**BATANGAS**, bä-täng'gäs. A seaport town, the capital of the province of the same name, on the island of Luzon, Philippines (Map: Luzon, F 12). The province covers an area of 1108 square miles on the peninsula opposite the island of Mindoro and had a population, 1903, of 257,715. It contains a number of high mountains and Lake Bingabon, or Taal, with the volcanic mountain of Taal in its centre. The province produces extensively sugar, coffee, rice, hemp, corn, oranges, bananas, and coconuts. There are forests of pine wood on the mountains, and the region is rich in mineral waters. The only important industry is the manufacture of dyestuffs, and silk, abaca, and cotton fabrics. The capital of the province, 72 miles south of Manila, lies at the mouth of the Calumpang River, on the east shore of Batangas Bay. It has a fine harbor. The city is well built, and among its prominent buildings are a royal palace, a prison, and a convent. A number of annual expositions are held in the city. Pop., 1903, 33,131.

**BATAN** (bä'tän) **ISLANDS** (Sp. *Islas Batanes*). A group of islands in the northern part of the Philippine Archipelago, situated north of the Babuyan group, between lat. 20° and 21° N. (Map: Philippine Islands, F 1). The principal islands are Ibayat, 35 square miles; Sabtán (Seminanga), 12; and Batan, 27 square miles. The total area of the group is 81 square miles. The population is about 10,000. Administratively the group forms a subdivision of Cagayan Province, with Santo Domingo de Basco (2347) on Batan as capital.

**BATATAS**, bä-tä'täs. See SWEET POTATO.

**BATA'VI.** The name of a German people who anciently inhabited a part of the present Holland, particularly the island which is called after them, Insula Batavorum. Their cavalry

was particularly good, and was often employed by the Romans. Their capital was Lugdunum Batavorum, now called Leyden. The first writer who terms the insular district inhabited by the Batavi, Batavia, is Zosimus.

**BATA'VIA**, *Dutch pron.* bä-tä'vē-ä. Properly the name of the island occupied by the ancient Batavi. At a later date it became the Latin name for Holland. The name BATAVIAN REPUBLIC was given to the Netherlands on their new organization by the French in May, 1795, and they continued to bear it till they were converted into the Kingdom of Holland, under Louis Bonaparte, in June, 1806.

**BATA'VIA** (*Batavia*, 'good land,' the ancient name of modern Holland, the motherland of the city in Java). The capital and chief city of the Dutch East Indies. It is situated on the north coast of Java, in lat. 6° 7′ S. and long. 106° 50′ E. (Map: East India Islands, C 6). It lies on the Bay of Batavia in a low and marshy plain, which is mainly devoted to the cultivation of rice. The temperature is warm and approximately uniform. Like most Colonial cities, Batavia consists of two parts, the old and the new city. The former is situated near the water and is occupied chiefly by business houses and factories and the residences of the natives and Chinese. In former years the Europeans also lived in the lower part of the city, but the excessive mortality from fever compelled them to remove to the upper and more elevated part. The modern city is built after the fashion of Dutch towns, with a few modifications to suit the exigencies of the climate. Streets and canals intersect, and houses are spacious and wide apart and are surrounded by luxurious gardens filled with the choicest tropical plants. The government buildings are of magnificent architecture. The Königs Plein is a parade ground one square mile in extent and surrounded by beautiful residences and fine public buildings, including the Governor-General's palace and the Museum of the Batavian Society of Arts and Sciences. The latter is a beautiful structure in Greek style, and contains, besides an extensive library, the largest collection of representative Javanese art in all its branches. The Batavian Society, in conjunction with the Dutch government, has contributed considerably to the science of archæology by the excavation of the ancient Javanese temples. The military buildings are extensive and well built. In regard to public utilities, Batavia is in no way inferior to any European city of its size. It has good steam tramways, electric railways, telephones, electric lighting, and all other accessories of a modern city. Among its educational and charitable institutions are a gymnasium, a number of government and private high schools, an orphan asylum, a medical school for natives connected with the military hospital, and a number of scientific societies. Commercially Batavia is the most important city of the East Indies. It is the chief outlet for the numerous products of the Dutch East Indies, of which the most important are coffee, sugar, tea, rice, different spices, timber, dyewoods, diamonds, drugs, minerals, etc. Batavia stands in direct communication with the Netherlands, Great Britain, Germany, and Australia. A state railway connects the old town with the harbor, and a private line runs into the interior. About 36 miles south of the city is Buitzenzorg, the residence of the Governor-General.

The first European settlement on the site of the present city of Batavia was founded by the Governor-General Pieter Both, in 1610. Originally only a factory, it became the chief commercial centre of the Dutch East Indies, under the name of Jacatra, during the administration of the Governor-General, Coen (1618–32), who removed his seat from the Moluccas to the new settlement and erected some fortifications. In 1619 it was attacked by the joint forces of the kings of Bantam and Jacatra, assisted by the English, who were defeated, after a siege of five months, by Governor-General Coen. Since then the city has been known by its present name, and has grown rapidly, becoming by the end of the seventeenth century the foremost city of the East Indies. After the eruption of Mount Salak in 1699 the streams were choked with mud, the site became very unhealthful, and the centre of European population gradually shifted southward, where the modern city of Batavia is situated. The inhabitants of Batavia in 1900 numbered 115,887, of whom 9423 were Europeans, 26,433 Chinese, and 2828 Arabs. An enumeration in 1905 returned a total population of 138,551, of whom 8777 were Europeans, 99,320 natives, 28,150 Chinese, and 2058 Arabs. Batavia is the seat of a United States consul. Consult Conscience, *Batavia* (Paris, 1880).

**BATA'VIA.** A city in Kane Co., Ill., 44 miles west of Chicago, on the Chicago, Burlington, and Quincy and the Chicago and Northwestern railroads and on Fox River (Map: Illinois, D 2). It manufactures windmills, engines, pumps, wagons, and foundry products and also has important limestone-quarrying interests. Batavia was settled in 1833 and is governed under a charter of 1902, which provides for a mayor, elected biennially, and a unicameral council. Pop., 1900, 3871; 1910, 4436.

**BATAVIA.** A town, and the county-seat of Genesee Co., N. Y., 36 miles (direct) east of Buffalo on the New York Central, the Erie, and the Lehigh Valley railroads, and on Tonawanda creek (Map: New York, B 4). It is the seat of the State School for the Blind and has a public library, the Holland Purchase Museum and Land Office, which contains relics of the early history of this part of the State, good public and parochial schools, and an anti-masonic monument. The town is an important manufacturing centre, producing agricultural implements, shotguns, shoes, rubber tires, paper boxes, carriage wheels, shell goods, and interior woodwork. The water works and electric light plant are owned by the municipality. Pop., 1910, 11,613; 1920, 13,541. Batavia was founded by Joseph Ellicott in 1801 and incorporated as a village in 1823. Here lived William Morgan (see ANTI-MASON), who is said to have been abducted and killed by members of the Masonic Order in 1826 because of his intention to reveal the secrets of Masonry. Consult Seaver, *A Historical Sketch of the Village of Batavia* (Batavia, 1849).

**BATCH'ELLER,** GEORGE SHERMAN (1837–1908). An American soldier, jurist, and diplomat, born at Batchellerville, N. Y. He graduated in 1856 at the law department of Harvard University, was admitted to the bar in 1858, and was elected a member of the New York State Legislature in 1859, 1873, 1885, and 1889. During the Civil War he served in the Virginia campaigns, and at the siege of Charleston was appointed deputy provost-marshal-general of the Department of the South, and rose to be lieu-

tenant colonel of volunteers. In 1875 he became judge, representing the United States in the international tribunal of Egypt, and was elected presiding justice. After having been, in 1889–90, First Assistant Secretary of the Treasury, and in 1891 Minister to Portugal, he was reappointed to the international tribunal in 1897 and again in 1902.

**BATCH'ELOR,** GEORGE (1836– ). An American Unitarian minister. He was born at Southbury, Conn., and graduated at Harvard College, the Meadville Theological School (1863), and was secretary of the American Unitarian Association from 1894 to 1898, of the National Conference from 1870 to 1880, and chairman of that body in 1893–94. He was editor of the *Christian Register* from 1897 to 1911. Besides numerous sermons he published, in 1887, *Social Equilibrium.*

**BATCHIAN,** bät-shyän'. See BATJAN.

**BATE,** WILLIAM BRIMAGE (1826–1905). An American soldier and legislator. He was born near Castilian Springs, Tenn. He served as a volunteer during the Mexican War and afterward edited a newspaper at Gallatin, Tenn., where he also began to practice law in 1852. Previously he had been sent to the State Legislature, and from 1854 to 1860 held the office of Attorney-General for the Nashville District. He joined the Confederate army as a private and rose to the rank of major general. The confiscation of his property while he was still in the army left him penniless, and he had personal obligations amounting to $30,000, but he declined to take advantage of the bankruptcy law and had paid the amount in full by 1882.

**BATEAU,** bà'tō'. See BOAT.

**BATE'MAN,** SIR ALFRED EDMUND (1844– ). An English economist and public official. He was born in Nottinghamshire and received his education at Repton and at Brighton College. After allying himself with the ecclesiastical commissioners (1863) and the board of trade (1865), he studied law and in 1872 became a barrister. He served as secretary successively to the French commissioners of treaty negotiations (1877, 1881, 1882), to the international sugar conferences (1887–89), and to the trade and treaties committee (1890–92). In 1892, and again two years later, he was British delegate for the Portuguese and Spanish commercial negotiations. In 1897 he was president of the Royal Statistical Society, and in the same year he was appointed treasurer of the International Statistical Institute, serving in this position until 1909. For a time he was Comptroller-General for commerce, labor, and statistics at the British board of trade, and later he served as joint manager of the Imperial Institute, as chairman of the labor arbitration courts, and as chairman of the London advisory committee of labor exchanges. He received a jubilee medal in 1897 and three years later was created a K.C.M.G.

**BATE'MAN,** SIR FREDERIC (1824–1904). An English physician and scientific writer. He graduated at the University of Aberdeen in 1850 and in 1876 was elected fellow of the Royal College of Physicians. His appointments included that of consulting physician to the Norfolk and Norwich Hospital. His *Aphasia and the Localization of Speech* (1870) was crowned by the Academy of Medicine of France. He published also *Darwinianism Tested by Language* (1877) and *The Idiot and his Place in Creation.*

**BATEMAN,** KATE JOSEPHINE (MRS. CROWE) (1842–1917). An American actress. She was born at Baltimore, Md., the daughter of Hezekiah Linthicum Bateman, an actor and theatrical manager. Her mother was also an actress. With her sister, Ellen (later Mrs. Greppo), she appeared on the stage almost in infancy and exhibited unusual talent. In 1862 she began her career in New York as Julia, Pauline, Juliet, and Lady Macbeth, and made a remarkable success in London in 1863 as Leah. She married George Crowe, the former editor of the London *Daily News*, in 1866, and temporarily abandoned the stage, but returned to it in 1868, making a success in *Medea* in 1872, and with Henry Irving in *Macbeth* in 1875. The next year she played the title rôle in Tennyson's *Queen Mary.* In and after 1892 she conducted a school of acting in London and appeared in subordinate rôles in many well-known plays.

**BATEMAN,** NEWTON (1822–97). An American educator. He was born at Fairfield, N. J., graduated in 1843 at Illinois College, studied at Lane Theological Seminary, and from 1847 to 1851 was professor of mathematics at St. Charles College, Missouri. He was principal of the Female College at Jacksonville, Ill., from 1851 to 1857. From 1858 to 1868 he was State superintendent of public instruction for Illinois, and from 1875 to 1893 was president of Knox College. Besides these official activities he was interested in many educational societies.

**BATES,** ARLO (1850– ). An American author. He was born at East Machias, Me., and was graduated from Bowdoin (1876). He became the editor of the Boston *Sunday Courier* (1880–93) and afterward professor of English in the Massachusetts Institute of Technology. Among his novels are *The Pagans* (1884), *The Wheel of Fire* (1885), *The Philistines* (1888), *The Puritans* (1899), and *Love in a Cloud* (1900). His poems are collected in *Berries of the Brier* (1886), *Sonnets in Shadow* (1887), *A Poet and his Self* (1891), *Told in the Gate* (1892), *The Torchbearers* (1894), and *Under the Beech Tree* (1899); his criticisms in *Talks on Writing English* (1897), *Talks on the Study of Literature* (1898), *The Diary of a Saint* (1902), *Talks on Teaching Literature* (1906), and *The Intoxicated Ghost* (1908). In 1912 he wrote an introduction for E. P. Whipple's *Charles Dickens* (2 vols.).

**BATES,** BLANCHE (1873– ). An American actress, born at Portland, Ore. She made her début in San Francisco in a benefit performance of Brander Matthews's *This Picture and That.* Among her early successes were her Mrs. Hillary in *The Senator,* Phyllis in *The Charity Ball,* and Nora in *A Doll's House.* She joined Daly's company in 1898 and the next year at Daly's Theatre, New York, played Mirtza in *The Great Ruby.* In 1901 she appeared as Cigarette in *Under Two Flags* at the Garden Theatre in New York. Thereafter devoting herself to the productions of David Belasco, she won great success in *The Darling of the Gods* (1902) and *The Girl of the Golden West* (1905). Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

**BATES,** CHARLEY. A pupil of the Jew Fagin, and companion of the "Artful Dodger," in Dickens's *Oliver Twist.*

**BATES,** CHARLOTTE FISKE (MME. ROGÉ) (1838– ). An American writer, born in New York City. She published a volume of verse,

under the title *Risks and Other Poems* (1879), contributed many articles to magazines, and edited the *Longfellow Birthday Book* (1881), *The Seven Voices of Sympathy* (1881), and the *Cambridge Book of Poetry and Song* (1882). In editing the first-named works she coöperated with the poet Longfellow, whom she also assisted in compiling his *Poems of Places*. In 1891 she married M. Adolphe Rogé, who died in 1896.

**BATES,** EDWARD (1793–1869). An American lawyer and statesman. He was born in Belmont, Va., of Quaker parentage. He was appointed judge of the St. Louis land court in 1853, presided over the Whig National Convention in 1853, and subsequently became one of the leaders of the Republican party. At the national nomination convention in Chicago in 1860 his name was proposed for the presidency, and he received 48 votes on the first ballot. From 1861 to 1864 he was a member of Lincoln's cabinet as attorney-general, and worked indefatigably to secure the success of the Union cause during the Civil War. Afterward, until his death, he devoted himself wholly to the practice of his profession.

**BATES,** HENRY WALTER (1825–92). An English naturalist and traveler, born at Leicester. He became acquainted with A. R. Wallace, and in 1848 he and Wallace went to the Amazon, paying their expenses by the sale of duplicate specimens. Bates spent three years at Pará and seven years on the upper Amazon. At Ega, on the upper Amazon, he found 550 new species of butterflies. He returned to England in 1859, having found 8000 species new to science. Like Darwin, he suffered much from dyspepsia after his return, but published *The Naturalist on the River Amazons* (London, 1863), a work which has become a classic. In his "Contribution to Insect Life of the Amazon Valley: Lepidoptera; Heliconidæ" (*Linn. Soc. Trans.*, vol. xxiii, London, 1862), he considers the phenomenon of mimicry and gives a philosophical explanation of it. After reading it, Darwin wrote: "I rejoice that I passed over the whole subject in the *Origin*, for I should have made a precious mess of it." In 1864 he was made assistant secretary of the Royal Geographical Society, a position entailing much executive work, which he administered with great credit. He edited several of the *Transactions*, as well as many books, including Belt's *Naturalist in Nicaragua*. He was elected a fellow of the Royal Society in 1881. He married Sarah Ann Mason in 1861. A large part of his collections are in the British Museum. Consult *The Field*, London, Feb. 20, 1892.

**BATES,** JOHN COALTER (1842– ). An American soldier, born in St. Charles Co., Mo. He was educated at the Washington University in St. Louis, and joined the Federal army in 1861 as a lieutenant in the Eleventh Infantry. He was on General Meade's staff from Gettysburg to the close of the war, was made a colonel of the Second United States Infantry in 1892. He served for 30 years chiefly in the Indian country. At the outbreak of the war with Spain he was a brigadier general of volunteers, and he was promoted to the rank of major general of volunteers during the Santiago campaign. He was military governor of Cienfuegos in 1899 and went that year to the Philippines, where he conducted the negotiations with the Sultan of Sulu. In April, 1900, he commanded the department of southern Luzon. He was made a brigadier general in February, 1901, a major general in July, 1902, and in February, 1906, lieutenant general and chief of staff, to succeed General Chaffee. The following April he retired.

**BATES,** JOSHUA (1788–1864). An American financier, born at Weymouth, Mass. In 1828 he became associated with the great house of Baring Brothers & Co., of London, of which he eventually became the senior partner. He was umpire of the commission convened in 1853 to arbitrate the claims of American citizens arising from the War of 1812. In 1852 he founded the Boston Library by giving $50,000 for that purpose, with the provision that the interest of the money should be expended for books of permanent value, and that the city should make adequate provision for at least 100 readers. He afterward gave 30,000 volumes to the institution, the main hall of which is named "Bates Hall" in his honor. Consult *Memorial of Joshua Bates* (Boston, 1865).

**BATES,** KATHARINE LEE (1859– ). An American author, born at Falmouth, Mass. She graduated at Wellesley College (1880) and taught there after 1885, becoming professor of English literature in 1891. She wrote: *Rose and Thorn* (1889), juvenile stories; *Hermit Island* (1891), a story for girls; *The College Beautiful and Other Poems* (1887); *The English Religious Drama* (1893, 1902); *A History of American Literature* (1898); *Spanish Highways and Byways* (1900, 1912); *From Gretna Green to Land's End* (1907); *Story of Chaucer's Canterbury Pilgrims* (1909); *America the Beautiful and Other Poems* (1911); *In Sunny Spain* (1913). She edited many texts, including *Early Poems of Alice and Phœbe Cary* (1903) and Tennyson's *Princess* (1904), and prepared, with Lilla Weed, *Shakespeare; Selective Bibliography and Biographical Notes* (1913).

**BATES,** LINDON WALLACE (1858–1924). An American civil engineer, born at Marshfield, Vt., and educated at Yale College. After the completion of engineering studies he was appointed assistant engineer for the Northern Pacific and Oregon Pacific railways, and subsequently was contracting engineer or manager of a number of important contracts in connection with the building of transcontinental railways. His advisory services were employed by the governments of Belgium, Great Britain, and Russia in such large undertakings as the improvement of the port of Antwerp, the enlargement of the Suez Canal, and the increasing of Black Sea harbor efficiency. For the authorities of Queensland, South Australia, and India he designed a number of harbors and planned the regulation of several rivers. A scheme for the improvement of the port of Shanghai was also prepared by him, working in coöperation with other engineers of international reputation. In the United States one of Bates's big contracts was the raising of the grade at Galveston after the flood there, and it was he who designed the "three-lake" plan for the Panama Canal. In 1900 the French government conferred on him a *Grand Prix* and decoration for "distinguished services to science"; and he was chosen to membership in various foreign as well as American engineering societies. He wrote: *The Navigation Interests of Nations in Ports and Waterways* (1900; Fr. trans., 1900); *The Panama Canal* (1905); *Retrieval at Panama* (1907).

**BATES,** SAMUEL PENNIMAN (1827–1902).

American educator and writer, born in Men[illegible], Mass. He graduated at Brown University [illegible]351. In 1860 he was made deputy State [illegible]ntendent of schools and in 1866 State his[illegible]n of the State of Pennsylvania. His numer[illegible]ectures and reports did much to further the [illegible] of education. He published: *Lives of the [illegible]nors of Pennsylvania* (1873); *Life of Gen. [illegible] Knowles* (1878); *Battle of Gettysburg* [illegible]); *Battle of Chancellorsville* (1882). His [illegible]ational works include *Lectures on Moral and [illegible]l Culture* (1860), *Liberal Education* (1865), *Method of Teachers' Institutes* (1862), [illegible] *History of Colleges in Pennsylvania.*

**BATE'S CASE.** At the beginning of his [illegible] James I of England, following the bad [illegible]ole set by Mary and Elizabeth, laid duties [illegible]apositions" on certain goods, including cur[illegible] and tobacco, without securing a parlia[illegible]ry grant. In 1606 John Bate, a London [illegible]ant and member of the Levant Company, [illegible]d to pay these charges on a cartful of [illegible]s and was promptly committed to the [illegible]halsea for contempt of the King's officers. [illegible]Commons sided with Bate; but the King's [illegible] prerogative" to levy impositions on ex[illegible] and imports was declared by a unanimous [illegible]n of the barons of the Court of Exchequer. [illegible]nconstitutional practice was thus sustained [illegible] decision which is generally regarded as [illegible]. The Bate Case is, therefore, an incident of great historical significance, marking the be[illegible]g of the long and bitter struggle with the [illegible]s to maintain the constitutional right of [illegible]ment to grant all supplies. Consult Gard[illegible] *History of England,* vol. ii (London and New York, 1889).

**BATES COLLEGE.** An undenominational institution for both sexes, at Lewiston, Me., opened in 1863, chartered in 1864, an outgrowth of Maine State Seminary, chartered in 1855. Bates was the first Eastern college to afford collegiate education to women, and her first woman graduate, 1869, became a professor in Vassar College. Abstinence from intoxicating drinks is a condition of student membership. The courses of study cover the usual range of undergraduate work. All candidates for degrees (A.B. and B.S.) make their selections of subjects under a system of majors and minors arranged in three groups—languages, philosophy, sciences. Alone among New England colleges Bates has no secret fraternities. It has 15 buildings and well-equipped chemical, physical, and biological laboratories. The libraries contain about 40,000 volumes. The campus covers 60 acres and with the buildings has a value of upward of $500,000. The invested funds amount to $760,000. The college has 99 scholarships and shapes its entire policy with a view to aiding students of limited means. In 1913 it had 33 officers and instructors and 450 students. [illegible]tes has won special distinction by the succ[illegible]s of her students in intercollegiate debates—[illegible] victories in 32 contests. Of the 1839 gradua[illegible], about 43 per cent have become educators. President, George C. Chase, D.D.

**BATESVILLE,** bat[illegible]ty and the county-seat of Independe[illegible]k., 114 miles by rail north by east o[illegible]k, the State capital, on the White,[illegible]d on the St. Louis, Iron Mountain,[illegible]ern Railroad (Map: Arkansas, D 2). [illegible] has transportation facilities by w[illegible]e White River is navigable for a c[illegible] portion of the year. A system of locks and dams, estimated to cost $1,000,000, has been built by the Federal government to insure permanent navigation for a distance of about 100 miles above the city. Seven more, to cost $2,000,000, are contemplated. Batesville is the seat of Arkansas College (Presbyterian), opened in 1872, the Masonic Home and School, and the Odd Fellows Home and School for Widows and Orphans. It has extensive quarries of manganese ore, phosphate rock, sandstone, limestone, and marble; makes large shipments of building stone, cotton, and lumber; and manufactures staves, flour, lumber products, carriages, wagons, etc. The water works and electric light plant are owned by the municipality. Pop., 1890, 2150; 1900, 2327; 1910, 3399.

**BAT'FISH.** 1. One of the small, pediculate fishes of the family Malthidæ, related to the angler or fishing frog. The commonest American species is *Malthe* (or *Ogcocephalus*) *vespertilio*, the sea bat or diablo of West Indian waters, which is grayish brown above, covered with bony tubercles, and reddish below, and abounds in the warmer regions of the Atlantic, where it sits on the bottom, supported by its fins, much in the attitude of a toad. Its remarkable abnormality arises from the excessively large and broad head compared with the short, slender trunk and the leg-like form of the pectoral fins. It is regarded as venomous by the ignorant. It has curious relatives in the deep sea. For illustration, see Plate of ANGLERS AND BATFISH. 2. One of the sting rays of the Pacific coast (*Myliobatis californicus*). (See RAY.) 3. A flying fish (q.v.). 4. A flying gurnard of the Atlantic (*Cephalacanthus spinarello*). See GURNARD.

**BATH,** băth. By bathing is usually understood the immersion of the body, or a part of it, in water. In a more extended signification it means the surrounding of the body with any medium differing in nature or temperature from its usual medium; thus we speak of a vapor bath, a cold-air bath, an earth bath. A fourfold division may be made of baths: (1) According to the substance with which the body is surrounded—whether liquid, gaseous, or mixed, water, oil, wine, milk, blood, gas, sand, mud, and other baths; (2) according to the manner of application—into river, plunge, shower, dropping, vapor, electric, and douche baths; (3) according to the parts of the body subjected to the application—into whole, half, sitz, foot, and eye baths; and (4) according to the temperature of the substance applied—into cold, tepid, warm, and hot baths.

The most ancient historical accounts as well as popular myths make mention of bathing. Among the Egyptians the bath was practiced as a religious rite; and in general we find the opinion prevailing, throughout antiquity, that purification of the body symbolized moral purity. In making the bath a religious ordinance, Moses may have had in view the prevention or more speedy cure of those skin diseases so prevalent in the East. The Mosaic law prescribes expressly, in some cases, the use of running water, which has given rise, through a misunderstanding, to the deleterious cellar baths of the Jews. In Palestine the wealthier Jews had private baths in their houses, and ponds in their gardens—an arrangement which prevailed in all the civilized parts of the East, and still obtains. There were, besides, public bath houses among the Jews, as among other nations.

**Greece.** Among the Greeks, also, bathing was very early in use. They early used both fresh water and salt, took advantage of natural hot springs, and employed water artificially heated. A bathroom containing a clay tub was found in the prehistoric palace at Tiryns, and in Homer the warm bath is frequently used for refreshment and is part of the entertainment offered an honored guest. Bathtubs, for which water was heated, were used, and the washing was followed by an anointing with oil. Bathing among the Greeks was a religious rite and was connected with the preparations for sacrifice, for the reception of oracles, for marriage, etc. It was at Athens that the luxury of warm baths was especially developed after the fifth century B.C. There were public baths where a slight fee was required, baths conducted by private enterprise at higher rates, baths in the wealthy private houses, and others connected with the gymnasia. The Athenians knew the vapor, hot, plunge, and douche baths preceding the cold baths. Allusions in the ancient writers, as well as scenes on the vase paintings, show that the bathers frequently stood beside a large basin on a high stand. We also find men and women bathing under douches, the water pouring from spouts in the wall. There were swimming baths for each sex, but there is no reason to believe that the later Roman custom of promiscuous bathing ever prevailed in Greece. The baths never reached such splendor of construction or such importance in the daily life of the Greeks as they did in that of the Romans.

**Rome.** Among the Romans the public baths were long the only ones in use and consisted of but two halls, one for each sex. Every town and even village had one bath or more. In Rome itself there were over 800 in the fourth century A.D. This number does not include the magnificent imperial *thermæ*, which were much more than baths; nor the private baths, without which no house of any pretensions was complete. At first the Romans bathed but seldom; Seneca says they washed their arms and legs every day, their whole bodies once a week. Scipio Africanus Maior had a warm bath in his villa at Liternum. Sergius Orata, about a century before Augustus, was the first to make a bathroom over a *hypocaust*, or basement filled with hot air—a discovery which was developed into a system of hot-air chambers beneath the floor and in the side walls of the *calidarium*, or room for the hot bath, giving an even, hot temperature. Probably the increase of comfort due to this invention was the cause of the growth in both the number and the popularity of baths towards the close of the republic. Mæcenas was the first to have a swimming tank of hot water, and Agrippa was the first to build immense thermæ on an elaborate and systematic plan, with all the luxuries of Græco-Oriental tradition improved by Roman practical inventiveness. The type of the Augustan age can be studied in the descriptive text of the Roman architect Vitruvius. The later Imperial thermæ became the centre of the public leisurely life of Rome, including libraries, lecture rooms, gardens, porticoes, gymnasia, running tracks, and every variety of incentive to luxurious ease. They were thus combinations of the Greek gymnasia and elaborate bathing establishments. The principal Imperial establishments of this kind were those of Titus, Trajan, Caracalla, and Diocletian. They covered enormous spa[illegible] in the heart of the city.

It is worth while to note that the R[illegible] called a bathing vessel *balneum*. Later, th[illegible] plied this word, or *balneum*, or *balneari[illegible]* a bathroom, properly to a simple room in [illegible] vate house. The plural forms, *balneæ* an[illegible] *neæ*, were applied to the ordinary public [illegible]. The term *thermæ*, which properly denot[illegible] springs, was used of the luxurious bathing [illegible] tablishments of the Imperial age, described above.

The system of bathing in all the v[illegible] classes of bathing establishments was [illegible] mentally the same, except when special [illegible] ment was prescribed by medical advice. Galen recommended the following succession: (1) [illegible] air bath in laconicum, or sweating room; (2) hot-water bath; (3) cold bath; (4) massage. That other great physician, Celsus, recommended: (1) sweating, dressed, in tepidarium (2) sweating, disrobed, in calidarium [illegible] douche bath, first hot, then tepid, then cold (4) scraping, rubbing, and anointing. The essential parts of the bathing establishments were (1) a vestibule for loungers, servants, and attendants, and sometimes an atrium; (2) an undressing room, or apodyterium, though often the bathers undressed in the larger bathing rooms; (3) the frigidarium, or hall for cold baths, with a sunken basin at one end or in the centre, often large enough for a swimming tank; often the bathers contented themselves with the cold bath; (4) the tepidarium, a hall not used for bathing, but kept at a moderate temperature to serve as transition between the hot and the cold bathrooms, used for dressing and undressing, anointing and waiting; it was fitted out with a sunken tank for hot water at one end, and a raised basin at the other for cold water; (5) the calidarium, or hall for hot baths; under it was the hypocaust, or hollow floor filled with hot air from the furnace, which was conveyed also into the hollow walls around the calidarium. With the furnace were connected three boilers, the lower one containing hot water, the middle one warm, and the upper cold water, so connected by pipes that when hot water was drawn off from the lower boiler it was replaced by tepid water from the one above, and that again by cold from the uppermost. The scraping off of the perspiration by strigils, and the anointing with oil, which at first took place in the calidarium, were afterward transferred to the tepidarium, or to a special hall called the unctorium, the last hall toward the exit. Connected with the calidarium was the laconicum, or sweating room.

There are many remaining examples of Roman baths of the various classes. Those at Pompeii form the most interesting and varied group outside of Rome. The [illegible] of the Villa of Diomedes shows the [illegible] found in the wealthy private house (open [illegible] bath, dressing room; frigidarium; tepidarium; calidarium); the public ancient baths, which show two complete sections, one for each [illegible] the normal plan of the age of Vitruvius, [illegible] the development of the elaborate Imperial [illegible]. (Consult Mau-Kelsey, *Pompeii*, [illegible] 1902.) One of the best preserved of [illegible] baths of moderate size is in Germany [illegible] weiler, also with its two sex divisions. [illegible] most interesting example of the [illegible] symmetrical arrangement. Special [illegible] are, of course, to

found in famous curative thermal establishments such as those at Baiæ. The most monumental ruins of Roman baths are those of Caracalla and of Diocletian. The tepidarium of the latter was transformed by Michelangelo into the church of Santa Maria degli Angeli. It was a magnificent hall 300 feet long and 92 feet wide, covered with a groin vault in three compartments. The halls of Caracalla's thermæ, though smaller—the tepidarium being 170 × 82 feet—were better proportioned and more artistic in decoration. These thermæ had a profusion of marble columns, surface decoration of rich marble slabs, coffered ceilings, rich cornices, mosaic floors, a wealth of decorative statuary and hangings.

The process of bathing was usually as follows. After undressing in the apodyterium, the bather was anointed in the elæothesium with oil and then proceeded to a spacious court devoted to exercises of various kinds, among which games of ball held a prominent place. After exercise he went through the tepidarium into the caliderium to sweat and take a hot bath; he then plunged to the frigidarium, took a cold bath, and returned to the calidarium or laconicum for another sweat. He was then rubbed and anointed by the attendants and resumed his clothing. Sometimes the bather went at once to the hot room and followed the sweat with a cold plunge and a rubbing and anointing.

The public baths for women were much frequented, even by the most respectable. The women bathed in company, like the men. When there were no separate baths for women, they seem to have had the exclusive use of the public baths at special hours. At Rome the great baths were for men only, but were frequented by dissolute women. The irregularity of men and women bathing together is also alluded to by ancient writers; several emperors legislated against it. In later times the baths in general became the scenes of all sorts of debauchery, as was the case at Baiæ. Consult Lanciani, *Ancient Rome in the Light of Recent Discoveries* (New York, 1888).

**The Orient.** The barbarian invasions and wars finally put an end to Roman culture in the West in the sixth century A.D., and with its fall the sumptuous baths were abandoned. There were still baths on a small scale in connection with churches and monasteries, and the sacrament of baptism preserved the religious symbolism of the bath. The habits of monasticism and of asceticism combined, however, with northern rudeness in discouraging the luxurious aspects of bathing. It was not so in the East, for the Byzantine Empire continued in this as in most respects the traditions of Rome; and life in Constantinople, in the time of Justinian and Theodora and their successors, was no less pleasure-loving than it had been in Rome. The Byzantines preserved there, for eight centuries more, all the various processes of Roman bathing, and initiated into them the conquering Arabs when, after founding the caliphate of Bagdad and the great kingdoms of Egypt and Spain, the Mohammedans adopted all the traditions of advanced civilization around them. From the eighth century to the present day all the Mohammedan cities of the East have been provided with public and private baths on a large scale. The baths at Brousa, for example, show how the main divisions of the Roman bath—frigidarium, tepidarium, and caldarium—had been handed down unimpaired. A typical city, Adrianople, had some years ago 22 public baths. The private houses at Cairo, Damascus, and other cities show how common it has been for the wealthy Orientals to have baths. The peculiarities of the Russian bath were also inherited through the Byzantines. The reason for this was both religious and sanitary.

**Turkish Baths.** Islam enjoins on the believer the careful preservation of corporal purity and for this purpose prescribes repeated daily ablutions. Besides these, certain circumstances and times make the use of the bath ritually obligatory on both men and women. For this end not only did the rich erect splendid baths in their houses and gardens, but bath houses for the people in general were established in every town in which there was a mosque. The public baths of the Turks of the present day are a copy of those ancient Arabian baths. The construction of those Oriental baths, imitations of which are now to be found in most cities, is as follows: The building is of stone; the bathrooms have a floor of marble, which is heated from below, and tubes in the walls conduct the heat in all directions. The bather undresses, wraps himself in a sheet, puts on wooden slippers, to protect him from the heat of the floor, and enters the bathroom. Here a general perspiration soon breaks through the skin, which is washed off with cold water. The body is then rubbed with woolen cloths and smeared with a soap or salve beneficial to the skin. This is generally accompanied by the operation of "kneading." The bath attendant stretches the bather on a table, pours warm water over him, and manipulates and scrubs his whole body. He then dries the body with a haircloth, rubs off the hard skin of the feet with pumice stone, anoints the bather with soap and perfumes, and finishes by cutting his hair and beard. This treatment lasts some three-quarters of an hour. After bathing, the bathers repose in a cooler room, stretched on couches, and finally partake of coffee, sherbet, or lemonade.

**Europe.** In England, France, and Germany, public establishments for bathing were long unknown. It was during the Crusades, which brought the East and the West into contact, that Europeans first became acquainted with the baths of the Asiatics; and the want of such institutions came to be more sensibly felt from the leprosy and other skin diseases which intercourse with Asia introduced into western Europe. The evil was at first sought to be met by establishing hospitals, but as these were found insufficient, baths and bathrooms were erected, which gradually became public establishments. Still, very little has been done to bring back the antique millennium until this century. It was not until the eighteenth century that the custom of sea bathing and mineral-water bathing began in England, followed by Germany at the close of the century, and by Italy and France early in the nineteenth century. (See BATH HOUSES, MUNICIPAL.)

**Russia.** Besides the kinds of baths already described, there are now to be found in the larger cities of Europe and America, generally in connection with water baths, an improvement upon the vapor baths which have been long in common use in Russia. The Russian bath consists of a small apartment built of wood, with broad benches running round it, on which the people lie undressed. By throwing water upon

glowing hot pebbles a dense hot steam is produced which envelops the bathers and throws them into such a heat that the perspiration breaks out over the whole body. In this atmosphere of steam the thermometer often rises to 112°–140° F. After they have sweated for some time, and from time to time cooled themselves again, by having cold water poured over them, the skin is rubbed with soap and with towels made of inner bark or with brushes; they are flogged with softened birch twigs and then washed with tepid and afterward with cold water, and at last have cold water dashed over them. A bather will also go direct from the sweating bath and plunge into a river or a pond or roll himself in the snow. These baths are a necessity in Russia and are to be found in every village. The German vapor bath differs in this, that the steam is produced in a boiler, and that the bather remains for some time in an adjoining room of moderate temperature, wrapped in blankets, to allow the perspiration to go on and the blood to become calm. A ruder kind of sweating bath, in a hole in the earth or in a baking oven, is practiced among many nations —among the Finns, the natives of Mexico and South America, and others.

**Therapeutic Baths.** As regards detergence, the *vapor bath* is the only kind of bath that is really effectual. If the skin is exposed to the action of hot water vapor, the scurf becomes softened and loosened, and is more easy to remove by simple rubbing. In the vapor bath, as in the Turkish bath, in which dry heat is used, the person is cooled by having tepid or cold water dashed upon him. The vapor bath is useful in certain diseases of the skin and kidneys as well as in chronic rheumatism. Its temperature is usually over 99° F. The *continuous bath*, in which the patient remains partly or wholly submerged in warm water for extended periods of time, was first introduced into this country by Dr. A. Rose of New York in 1873. Erysipelas and cerebro-spinal meningitis were treated in this way with marked success. Later the continuous warm bath was introduced by Dr. E. C. Dent into insane asylums, where it was found to calm maniacal patients and induce sleep, replacing sedative drugs and the crude methods of forcible restraint. The continuous bath is used in several foreign health resorts, notably in Leuk in the Alps and in Kewanaka in Japan. Here patients remain in the water for days or weeks at a stretch. Prolonged immersion in warm water stimulates metabolism and increases the elimination of waste products from the body.

The cold sponge bath is useful as a daily tonic to most people. It is a stimulant to nutrition, circulation, and nerve action. It should be brief and followed by brisk friction with the towel. By exhausted, and generally by aged, as well as by thin, nervous, and sensitive persons, cold baths should be avoided, and tepid ones taken instead. A bath in the sea is productive of good in most cases in persons of good physique. Wrapping a patient in a wet sheet and then covering with a blanket (the "wet pack") is sometimes substituted for the cold bath. The hot bath is stimulant, relieving pain and limiting inflammation, controlling convulsions, and inducing sleep. It is useful also in some diseases by causing sweating. At sanitariums and bathing establishments, salt-rubs, electro-chemical, electro-thermal, and other baths are given. The *Roman bath* consists of an application of oil or vaseline, with massage.

A *medicated bath* is one in which some substance intended to act as a medicine has been mixed with the liquid. This is an ancient and almost obsolete method of bringing remedies to bear upon the system. The mineral substances used were common salt, chloride of lime, nitric acid, corrosive sublimate, the hydroxides and carbonates of sodium and potassium, ashes, iodine, sulphur, iron, etc.; the vegetable ones, wine, vinegar, solutions of essential oils, infusions of thyme, rosemary, lavender, worm wood, willow, oak, Peruvian bark, etc. *Mercurial baths* are used in syphilis. They are baths in which vapor of mercury is applied to the whole surface excepting the head. The application must be made in a fumigating box, in which the body alone is inclosed along with the vapor, in order that the respiratory organs may not be incommoded. *Animal baths*, used by the ancients, enjoyed a great reputation in cases of lameness. Either the whole or part of the body of the patient was wrapped in the skin of a newly slaughtered animal. Sometimes small animals were killed, split up, and immediately applied to the diseased part. Of *gas baths*, the most generally used are those of sulphuretted hydrogen and carbonic acid gas, which are to be had at certain mineral springs. In recent times, at Ischl and other places, the vapors that arise from the mineral springs loaded with saline particles are received in close rooms, in which the patients walk about and allow the vapors to act upon the lungs and skin. Consult A. Rose, *Carbonic Acid in Medicine* (New York, 1905). See BATH HOUSES, MUNICIPAL; HYDROTHERAPY.

Te terms *water bath* and *sand bath* have been adopted in chemistry to signify a contrivance by which vessels are heated without being brought into immediate contact with the flame, but receive their heat through the medium of hot water or sand.

**BATH,** bȧth (Celt. *Caer-badon,* city of baths, AS. *Bathan, Bathum,* short for *æt thæm hătum bathum,* at the hot baths; the Roman *Aquæ Solis,* baths of the sun). The chief city of Somersetshire, England, beautifully situated in a wooded valley, inclosed on the north and east by a high range of hills, on the Avon (which is here crossed by four bridges), 20 miles from its mouth, and 108 miles west by south of London (Map: England, D 5). The houses are built of white freestone—"Bath Oölite"—worked in the neighboring quarries. The city has a finer appearance than any other in England, the variety of levels giving commanding sites for its fine and regular streets, crescents, and public buildings. The beauty and sheltered character of its situation, the mildness of its climate, and especially the curative efficacy of its hot chalybeate springs, have long rendered Bath a favorite fashionable resort. The springs, which are four in number, were known to the Romans, who built baths on the spot in the first century, of which extensive remains were discovered in 1775. The temperature of the springs varies from 116° to 120° F. They rise near the river bank, in the centre of the city, and discharge more than half a million gallons of water daily. The water is most useful in bilious, nervous, and scrofulous complaints, palsy, rheumatism, gout, and cutaneous diseases. Bath has many handsome public buildings, among them being the pump room which includes some of the springs.

and which has been improved in recent years; the guild hall, containing in addition to the municipal offices, technical schools, an art gallery and reference library; and the Royal Literary and Scientific Institution, containing several fine scientific collections and a library. The abbey church of St. Peter and St. Paul is a cruciform building in the perpendicular style, dating from the sixteenth century. It has a tower 162 feet high and on account of the number and size of its windows has been called the "Lantern of England." Among many other churches those of St. Swithin's and St. Thomas of Canterbury are the most interesting. There are several fine parks, including the Victoria Park of about 50 acres, containing a botanical garden and an excellent theatre. The city is well lighted by electricity, which the corporation supplies. It also maintains a museum, public baths, and markets. Bath is amply supplied with educational facilities. In addition to the technical school maintained by the corporation there is a grammar school founded by Edward VI, at which De Quincey was educated, Lansdown Royal School, for Officers' daughters, and Wesleyan College. Its charitable institutions include numerous hospitals and an eye and ear infirmary. Its three railway lines, and the Kennet and Avon Canal connecting the city with the Thames River, furnish excellent means of communication. It is a parliamentary borough and sends two members to Parliament. Bath was a royal residence in Anglo-Saxon times. Richard I and Edward III granted it many privileges. In the eighteenth century Richard Nash (q.v.) made it the most fashionable resort in England. Pop., 1901, 49,800; 1911, 50,729. Consult: "Municipal Roman Baths at Bath," in *Municipal Journal*, vol. viii (London, 1899); Bath Committee, *Handbook to Bath* (Bath, 1900); Perkins, *The Abbey Churches of Bath, Malmesbury* (London, 1901); Barbeau, *Une ville d'eaux anglaise au xviii^e siècle* (Paris, 1904); Green, *Eighteenth Century Architecture of Bath* (Bath, 1904).

**BATH.** A city, port of entry, and the county-seat of Sagadahoc Co., Me., on the Kennebec River, 12 miles from the sea, and 36 miles northeast of Portland (Map: Maine, C 5). It is on the Maine Central Railroad and has steamboat connections with Boston, Augusta, and Boothbay Harbor. Ship building is the main industry, and several vessels for the United States navy have been built here. There are also brass and iron foundries, machine shops, boiler works, and manufactures of lumber, manganese bronze, gasolene engines, steam windlasses, shirts, etc. Bath contains a public library, a hospital, a soldiers' and sailors' orphans' home, and two homes for aged persons. The charter was adopted in 1847 and the city ordinances revised in 1899. The charter limits the mayor's term to one year and provides for a bicameral city council. The majority of administrative officers are elected by the city council, though the mayor exercises some appointive power, subject to the consent of the board of aldermen. The superintendent of schools is chosen by the school committee, which is elected by the people. Pop., 1890, 8723; 1900, 10,477; 1910, 9396; 1920, 14,731.

The first settler within the present limits of Bath was probably Robert Gutch, a missionary to the Indians, about 1660. In 1781 the settlement was incorporated as the town of Bath, and in 1847 a city charter was obtained. Consult Reed, *History of Bath and Environs* (Portland, 1894).

**BATH.** A village and the county-seat of Steuben Co., N. Y., 75 miles south-southeast of Rochester, on the Erie, the Lackawanna, and other railroads, and on Cohocton River (Map: New York, C 6). It contains the Davenport Public Library, Davenport Orphan Asylum, the New York State Soldiers' and Sailors' Home, three parks, a soldiers' monument, and the various county buildings. The principal industries are agriculture, lumbering, wine storage, and the manufacture of aëroplanes, automobile engines, sashes and blinds, harness, tables, motor cycles, etc. Settled as early as 1793, Bath was first incorporated in 1816. The government, under a charter of 1895, is vested in a mayor, annually elected, and a village council. Pop. (exclusive of inmates in Soldiers' and Sailors' Home), 1900, 4994; 1910, 3884.

**BATH,** bȧth, EARL OF. See PULTENEY, WILLIAM.

**BATH,** ORDER OF THE. The name of the largest English order, and the highest to which a commoner can attain. Its name was evidently derived from the initiatory ceremony of bathing, which used to be practiced at the installation of a knight, as an emblem of the purity henceforth required of him by the laws of chivalry. It is asserted by Froissart that in 1127 Henry I made Geoffrey of Anjou and five others "Knights of the Bath," and Burke relates that Lord Willoughby received "knighthood by bathing" from Edward II. The last creation of Knights of the Bath in the ancient form was at the coronation of Charles II in 1661. From that period till the accession of the House of Hanover, the order fell into oblivion. It was revived by George I in 1725 and is now the second order in rank in England, the first being the Garter. The order was military till 1847, when it was reorganized by the admission of civil Knights, Grand Cross, Commanders and Companions. As constituted at present, the order comprises three classes—Knights Grand Cross (G.C.B.), Knights Commanders (K.C.B.), and Companions (C.B.), the two former including also honorary members. For illustration, see Plate II of ORDERS.

**BATH BRICK.** See BRICK; ABRASIVES; BRISTOL BRICK.

**BATHGATE,** bȧth'gāt. A town in the centre of Linlithgowshire, Scotland, 17 miles west-southwest of Edinburgh (Map: Scotland, E 4). The old town lies on a steep slope, and the new on a more level site. The celebrated gas-coal called Torbanehill mineral is worked here, and the district is rich in minerals. Bathgate manufactures paraffin, flour, glass, and paper, but mining is the chief occupation of the inhabitants. Pop., 1871, 6942; 1901, 6786; 1911, 8226. In 1668 King Charles II granted Bathgate a charter, from which time it was a free burg of barony until it was incorporated as a police burg in 1865. In the vicinity is the site of an ancient castle, which Margaret, daughter of Robert Bruce, brought as a part of her dowry to her husband, Walter, great steward of Scotland, who died here.

**BATH HOUSES,** MUNICIPAL. Liverpool was the first modern European city to construct inclosed bath houses with appliances for furnishing both hot and cold water. This was in 1842. In 1846 Parliament passed an act to encourage the establishment of public baths and washhouses, and since that time the movement in

favor of public baths has rapidly spread in Great Britain, until now every borough with a population of over 50,000 has municipally owned bath houses, and very many smaller cities are well supplied with such facilities. The cities of continental Europe do not possess so many public baths. The Public Health Exhibition of 1883 in Berlin, Germany, aroused public sentiment to the need of cheap baths for the people, and in 1900 Germany had municipal bath houses in 45 of its cities having a population of over 50,000. France has fewer, and in Austria, Norway, and Sweden baths have been erected in only the larger cities. In Vienna the first people's bath was built in 1887. At the close of the century the city operated 11 such establishments. In Russia people's baths are very common, even in the smaller villages, but these are not owned by the municipality and are often most unsanitary. The city of Tokio, Japan, is said to have 1000 public bath houses.

The movement in favor of municipal baths scarcely began in America until the close of the nineteenth century. The need of municipal baths in the larger cities was pointed out in the Report of the Federal Bureau of Labor in 1893, which showed, among other things, that in certain selected districts bathroom facilities were possessed by only 2.83 per cent of the population in Chicago and New York. At this time there were no all-the-year municipal baths in operation in the United States. Ten years later a list of 39 such baths was published in the report of the bureau, besides 59 beach or floating baths open in summer. In Statistics for the Cities for 1907, 32 cities report baths and bathing places valued at $1,541,733, of which 78 were all-the-year baths. The total bathing attendance was 29,204,838. In 1874 Massachusetts enacted a law permitting the public funds to be used for the erection of public baths and washhouses. But New York was the first American State to enact legislation making the erection of public baths compulsory. In 1895 a law was passed that all cities having a population of more than 50,000 should establish and maintain such free public baths as the local board of health might deem to be necessary, and that any city or village having less than 50,000 inhabitants might loan on its credit or appropriate of its funds for this purpose. The baths must be open 14 hours a day, and both hot and cold water must be provided. The maintenance of river, lake, or ocean-front baths is not to be considered a compliance with this act. The first bath house erected under the act was opened in Buffalo in 1897.

Of public baths there are four general types —beach baths, floating baths, pool baths, and shower baths. One of the best and most popular of the beach baths, as also the oldest, is the one which was constructed in 1866 on the L Street Beach, South Boston.

A floating bath usually consists of a platform placed upon floats, in the centre of which is a pool surrounded by dressing rooms. The pool is constructed of slats in such a manner that the water has free circulation through its sides and bottom. The floating bath may be moored at any convenient point along the water front and is especially suited for smaller cities located upon bodies of clean water. In large cities the increasing pollution of the water renders a suitable location for floating baths more and more difficult to find.

Pool baths were first built in 1885, in Philadelphia, as a substitute for floating baths, which the city was compelled to give up on account of the polluted water. Subsequently pool baths were built in Chicago, Holyoke, Boston, Newark, Utica, and Kansas City. Such a bath consists simply of a pool or tank surrounded by dressing rooms, and may or may not be roofed in.

The shower bath is entirely different, in both form and object, from the three types of baths already described. The former are open during the summer months only and are chiefly useful as places of wholesome exercise and recreation. But the shower bath is open throughout the year and furnishes hot as well as cold water, and its only object is cleanliness. The typical shower consists of an overhead douche or ring in which the water supply is controlled by a valve so arranged that the cold water comes out first and the temperature of the supply is controlled by the user. The floor under this spray is inclined so that the water rapidly runs off into a drain. Each bather is provided with a separate dressing room, opening into the bathroom. Shower baths are rapidly displacing the old-time tub or "slipper" baths in both Europe and America. Their advantages are obvious: they require less room, less water, and less attendance, and are therefore cheaper; they are also more easily kept in a sanitary condition, and the shower is a more healthful form of bath than the tub. The city of Baltimore late in 1908 made an interesting experiment in a so-called "portable bath house." This was located in a tent with a temporary connection with the city mains and was equipped with shower baths. So successful was the experiment that three such baths were operated in 1911. They are especially useful where large groups of people are temporarily collected, as at camps or where extensive work is going on.

A recent extension of free baths is their introduction into the public schools. This movement, like that for municipal baths in general, began in Germany, being established by Professor Flugge and Mayer Merkel in the schools of the German university town of Göttingen in 1885. Boston has introduced the institution into this country by constructing a number of public baths in the Paul Revere School, in the north end of the town, in 1900, and other cities are following its example.

Consult *Bulletin No. 54* of the United States Bureau of Labor (Washington, 1904); Reports of Free Public Bath Commission, Baltimore; William Paul Gerhard, *Modern Baths and Bath Houses* (New York, 1908); Alfred W. Cross, *Public Baths and Washhouses* (London, 1906).

**BATH'-KOL'** (Heb. daughter of the voice, from *bath*, daughter + *kol*, voice). An expression which signifies simply a sound and which is also used to designate an echo. Its specific application, however, in rabbinical theology is to a manifestation of the divine will by means of a voice distinctly heard and announcing an order on the decision of some disputed point. It corresponds therefore to an oracle, only that the source of the voice is regarded as hidden. This usage of the term reverts ultimately to such a phrase as is found in Daniel (iv. 31): "A voice fell from heaven." Similarly in the New Testament, heavenly voices are referred to at the baptism of Jesus (Matt. iii. 17; Mark i. 11), at His transfiguration (Matt. xvii. 5; Mark ix. 7; Luke ix. 35), before the Passion (John

xii. 28), and in the same way Paul and Peter hear voices from heaven. According to the views expressed in the Talmud, Bath-Kols were sent to Israel from time to time throughout its history, and numerous examples are instanced, and in theory such "voices" were regarded as decisive factors after the extinction of divine prophecy in Israel. So it is reported that, as late as the days of Hillel and Shammai, the differences between these two schools of interpretation of the Jewish law were decided by a Bath-Kol in favor of Hillel (Berachoth 3b). In general, however, the tendency developed not to be guided by supposed "voices," and so Bath-Kol came to be practically a term indicating the decision of a disputed question by rabbis whose authority was recognized. Consult: F. Weber, *Jüdische Theologie* (2d ed., Leipzig, 1897); Hamburger, *Real-Encyklopädie für Bibel und Talmud*, ii. s. h. v. (Strelitz, 1883); Bacher, *Die Agada der Tannaiten* (2d ed., 1903); Louis, "Ancient Traditions of Supernatural Voices: Bath-Kol," in *Transactions of the Society of Biblical Archæology*, vol. ix, p. 18.

**BATH'OLITH**, Bathylite, Bathylith (Gk. *βάθος, bathos*, depth, or *βαθύς, bathys*, deep + *λίθος, lithos*, stone). A great, poorly defined mass of plutonic rock that affords evidence of having been formed far within the depths of the earth's crust during early periods of geological time, and of having attained its present condition of exposure at the surface through the agency of erosion. Such masses are common among rocks of the Archæan or pre-Cambrian age, and often measure miles in extent. Evidence of the deep origin of batholiths is furnished by the coarsely crystalline texture of the constituent rocks—a structure produced only by slow cooling and solidification at great depths in the crust. This hypothesis is also confirmed by the fact that such batholiths appear to have been fused from below upward and to have incorporated within their mass portions of the overlying and surrounding rocks. See Igneous Rocks; Pre-Cambrian Formations.

**BATHOM'ETER** (Gk. *βάθος, bathos*, depth + *μέτρον, metron*, measure). An instrument invented by C. Williams Siemens, for indicating the depth of the sea beneath a moving vessel. The density of sea water is about 1.026, while that of solid earth or rock has an average of about 2.75. Hence the attraction of the water which lies beneath the ship is less than that which would be exerted by earth or rock occupying the same relative position, and the greater the depth of water, the less the attraction. The weight of a given mass on board the ship will be greater, therefore, when the ship is in a harbor or in shallow water than when on the deep sea by an amount which may be determined by an instrument of sufficient delicacy, and this change in weight becomes a recognizable function of the depth of water. Dr. Siemens filled with mercury a vertical steel tube of small bore, fitted below with a cup-shaped expansion closed with a corrugated steel-plate diaphragm. The pressure of the mercury upon the upper surface of the diaphragm is opposed by a plate adjusted to bear upon the centre of its upper surface, and this plate is supported by steel spiral springs, which are attached to the top of the column. In the construction of the instrument care was taken to compensate for the variations caused in the density of the mercury and in the elasticity of the steel springs by change of temperature. The pressure of the mercury in the diaphragm causes an extension of the steel springs by an amount depending on the force of attraction acting on the mass of the mercury. This extension of the spring is so magnified by a micrometer screw that the apparatus indicates a change of a fathom in depth of water for each division on the scale of the micrometer.

**BÁTHORY**, bä'tō-rē. A noble family of Hungary. Stephen Báthory (1533–86), was elected Prince of Transylvania in 1571 and King of Poland in 1575. He married Anna, sister of the last of the Jagellons of Poland. He introduced reforms in the administration of Poland and waged war successfully against Russia. His right hand in the government of Poland was the distinguished statesman, Zamojski.—His brother, Christopher, was Prince of Transylvania from 1576 to 1581. He was a friend of the Jesuits, by whom his son and successor, Sigismund Báthory (1572–1613), was instructed. The latter in 1595 married a daughter of the Archduke Charles of Styria, an uncle of Rudolph II. In 1598 he transferred the principality of Transylvania to Rudolph, as he intended to enter the priesthood. He soon regretted his renunciation of the territory, however, and while the Imperial commissioners were still negotiating the terms of acceptance, suddenly appeared disguised at Klausenburg and arrested them, sending Bocskay to Prague to pacify the Emperor. He was compelled to resign in 1602.—Gabriel Báthory (1589–1613), a son of Stephen, King of Poland, was elected Prince of Transylvania in 1608. In consequence of his cruelty the magnates of his realm, as well as the Saxon element of the country, rose against him, and during the war which ensued he fled to Grosswardein, where he was murdered.—Elizabeth Báthory, niece of Stephen Báthory, King of Poland, is celebrated as a type of fiendish cruelty. She is said to have slaughtered 650 young girls, in whose blood she used to bathe, to increase the fairness of her skin. She died in prison in 1614.

**BA'THOS** (Gk. *βάθος*, depth). A term employed by critics to designate a ludicrous descent from a lofty thought to a mean one, or a sinking below the ordinary level of thought in a ridiculous effort to aspire. (See Anticlimax.) A good example of bathos is the well-known couplet:

> "And thou, Dalhousie, the great god of war,
> Lieutenant-colonel to the Earl of Mar."

Consult Pope, "The Art of Sinking in Poetry," in the *Scriblerus Papers* (London, 1729).

**BATHSHEBA**, băth-shē'bà *or* băth'shē-bà (Heb. *bath*, daughter + *sheba*, oath; daughter of an oath). 1. The wife of Uriah, and afterward mother of Solomon. 2. The name under which Charles II's mistress, the Duchess of Portsmouth, appears in *Absalom and Achitophel*, a satire by Dryden. 3. The heroine of Thomas Hardy's *Far from the Madding Crowd*.

**BATHS OF TI'TUS.** See Titus, Baths of.

**BATH** (băth) **STONE.** A building stone extensively used in England on account of its beauty and obtained from quarries in the Lower Oölite of Wiltshire and Somersetshire. It is fine-grained, of a rich cream color, and is composed of carbonate of lime, with a little carbonate of magnesia, but without silica. The name is derived from the city of Bath, in the vicinity of which the stone is largely quarried.

**BATHURST,** bȧth′ûrst. A city and a county of New South Wales, Australia, 145 miles west of Sydney (Map: New South Wales, E 3). The city was founded in 1819 and was the first settlement beyond the Blue Mountains (q.v.), which were long believed to be impassable. In 1851 there were discoveries of gold here, and this, with copper and silver, is the chief mineral product. Fine statuary marble is quarried. The county is bounded on the northeast by the Macquarie River and on the southeast by the Lachlan. The whole district is admirably adapted to pastoral pursuits, and about a quarter of a million acres are under cultivation. Corn, barley, wheat, fruit, and tobacco are the chief products. It is well watered and, being 2150 feet above sea level, has a moderate temperature. Bathurst, the principal city in the western district of New South Wales, has handsome public buildings and various important industries. It was created a municipality in 1862. It is the see of Anglican and Roman Catholic bishops, has science and art schools, a museum, and a government agricultural experiment station. Pop., 1901, 9578; 1911, 8575.

**BATHURST.** The principal settlement of the British colony of the Gambia, West Africa, situated on the island of St. Mary at the mouth of the Gambia, in about lat. 13° 24′ N. and long. 16° 36′ W. (Map: Africa, C 3). The town is exceptionally clean and contains government houses, barracks, and a hospital. Facing the river are the stores of the European merchants. The exports consist of gum, wax, hides, rice, tobacco, cotton, groundnuts, rubber, and fruit. Medicinal roots and herbs and vegetables of all kinds are grown. There are a number of expert shipbuilders in Bathurst. The population in 1911 numbered about 5000. This included the Jollofs, which tribe inhabits the district in the vicinity of the town.

**BATHURST.** A port of entry on Nepisiguit Bay, at the mouth of a river of the same name, in Gloucester Co., New Brunswick, Canada (Map: New Brunswick, D 1). It is 211 miles north by east of St. John, is on the Intercolonial Railway, and is a popular summer resort. Bathurst has a good harbor, and its principal industries are connected with lumbering and fishing. The rivers emptying into the harbor are noted for fine salmon. The town is the seat of a United States consular agent. Pop., 1901, 1044; 1911, 960.

**BATHURST,** Allen, first Earl of Bathurst (1684–1775). An English statesman, born in London. He entered Parliament in 1705 and distinguished himself as a supporter of the union of England and Scotland. In 1711 Queen Anne made him a baron, and he won further distinction in the Upper House by impeaching the directors of the notorious South Sea scheme. Bathurst was a determined opponent of Walpole and on that minister's resignation in 1742 was made a member of the Privy Council. In 1757 he became treasurer to the Prince of Wales, who, as George III, elevated him to an earldom in 1772. He was a generous patron of literature, and the friend of Congreve, Vanburgh, Swift, Prior, Rowe, Addison, Pope, Arbuthnot, Gay, and others. Pope dedicated his *Epistles on the Use of Riches* to Lord Bathurst and complimented him in characteristic lines. His son Henry, second Earl Bathurst (1714–94), was Lord Chancellor of England, 1771–78. Henry, third Earl Bathurst (1762–1834), son of the second Earl, was English Colonial Secretary, 1812–27, and Lord President of the Council, 1828–30.

**BATHURST,** Ralph (1620–1704). The uncle of the first Lord Bathurst, an English physician, prelate, and wit. He rose to eminence in medicine and in the time of the Commonwealth was appointed physician to the state. After the Restoration he abandoned medicine, took holy orders, was chaplain to the King, and afterward Dean of Wells. In 1664 he was made president of Trinity College, Oxford, and in 1691 was nominated to the see of Bristol, but declined the place. He was master of ridicule and, like Dr. Jowett in recent times, made that his weapon to correct college delinquents. Some of his verses in the *Musæ Anglicanæ* are excellent of their kind. Consult Warton, *Life and Literary Remains of Bathurst* (London, 1761).

**BATHURST INLET.** An indentation of Coronation Gulf, in the Arctic Ocean, which projects 75 miles south into Canada, 300 miles northeast of Great Slave Lake (Map: Northwest Territories, H 1). The explorer Harry V. Radford wrote from this place, on June 5, 1912, that he had nearly completed his survey of the unexplored coast of the inlet. He and his comrade were killed a few days later.

**BATHURST ISLAND.** An island off North Australia, about lat. 12° S. and long. 130° E., 2°, 120 miles west of Port Essington, with Melville Island between (Map: Australasia, E and F 4). Its length and greatest breadth are 30 miles. The island is mountainous and densely wooded, except at the west end.

**BATHURST ISLAND.** A large island in the Parry Archipelago north of North America, intersected by the 100th meridian of west longitude and situated immediately beyond the 75th parallel (Map: America, North, H 2). Sherard Osborn here found the vertebræ of an ichthyosaurus—one of the few instances of organic remains discovered in the polar basin on the American side.

**BATHYÁNI,** bŏt′yä-nē. See Batthyányi.

**BATHYCLES,** băth′ĭ-klēz (Gk. *Βαθυκλῆς*). A Greek sculptor, born at Magnesia about 600 B.C. He has become celebrated through a colossal throne which he executed for the Spartans. This throne was decorated with reliefs which have been described by Pausanias. It was carved for the sanctuary of Apollo at Amyclæ and inclosed the rude statue of the god.

**BATIGNOLLES,** bȧ′tē′nyōl′. A former commune in the department of the Seine, France, now a part of Paris, forming with Ternes the seventeenth arrondissement. It is the Parisian equivalent for the Whitechapel of London and the East Side district of New York.

**BATISTE,** bȧ-tēst′. A fine linen or cotton lawn originally made in France, and said to have been named from its inventor, one Jean Baptiste. See Cambric.

**BATJAN,** bȧt-yän′. One of the Moluccas, lying west of Gilolo and east of Celebes. Batjan has a total area of 914 square miles (with adjacent isles, 1020 square miles), and a population estimated at 12,000 to 13,000, of which a few hundred are Chinese, Arabs, and Europeans, and the rest mostly Alfuros. The soil is fertile, and the main industry is the cultivation of spices, as on most of the Moluccas. It belongs to the Dutch, but is governed by a native sultan. There are several settlements, and on the western coast is situated Fort Barneveld.

**BATLAPI,** bȧt-lä′pē. A Bechuana tribe of

the Bantu family, living between Taungs and Vryburg; formerly a powerful tribe, now weakened by wars with the Boers and Matabeles. Though still the most numerous of the Bechuana group, they are under British control.

**BAT'LEY.** A town in the West Riding of Yorkshire, England, 8 miles southwest of Leeds, and about 1 mile from Dewsbury, with which it unites in sending one member to Parliament. The town was incorporated in 1868, and owns its gas and water works. It also maintains public baths, markets, a library, and a cemetery. There are an ancient grammar school, and a technical school supported by public subscription, with a municipal appropriation. Batley is the centre of the heavy woolen trade and manufactures army cloth, shoddy, drugget, etc. Coal is mined, there are stone quarries, and manufactures of iron and machinery. Pop., 1891, 28,800; 1901, 30,300; 1911, 31,429.

**BATNA,** bät'nȧ. The chief town of an arrondissement, department of Constantine, Algeria, 62 miles south-southwest of Constantine. It is situated at the foot of Mount Tugurt, which is covered with fine cedar wood. The town contains a church and a mosque and is an important military post and trading station between the Sahara and Tell. Pop., 1896, 8381; 1901, 6914; 1911, 8890.

**BATN-EL-HAJAR,** bät"n-el-hä'jär (Ar. womb of rocks). A stony district of Nubia, along the Nile, in lat. 21° N., where the river forms its second cataract.

**BATON, or BEND SINISTER.** See HERALDRY.

**BATONI,** bȧ-tō'nē, or **BATTONI,** POMPEO GIROLAMO (1708–87). An Italian painter. He was born at Lucca and worked first with his father, a goldsmith. His artistic education consisted chiefly in the independent study of Raphael and of the monuments of classic antiquity at Rome, where he passed most of his life. He was the friend and associate of Raphael Mengs and Winckelmann, but was less classical than the former in his art, retaining the charm of the Rococo, particularly in his color. He was the most celebrated painter of his day, and his works were sought after throughout Europe. Among the most important of these are the portraits of the popes Benedict XIV, Clement XIII, and Pius VI, and of the Emperor Joseph II and Leopold II, Grand Duke of Tuscany; "Marriage of St. Catharine" (Quirinal, Rome); "Achilles" (Uffizi, Florence); "Choice of Hercules" (Turin Gallery); "Madonna" (Louvre, Paris); "Magdalen," his best-known painting; "John the Baptist" and "The Fine Arts" (Dresden Gallery); "Marriage of Cupid and Psyche" (Berlin Museum). Consult O. Boni, *Elogio del cavalieri Pompeo Batoni* (Rome, 1787).

**BATON ROUGE,** bät'on rōōzh (Fr. red baton or stick). The capital of Louisiana, 79 miles by rail northwest of New Orleans, on the eastern bank of the Mississippi River, on the Louisiana Railway and Navigation Company line, and on the New Orleans, Texas, and Mexico, Morgan's Louisiana and Texas, and the Yazoo and Mississippi Valley railroads (Map: Louisiana, D 3). It is a picturesque city, built on the river bluff, and contains the State University, organized in 1860, State educational institutions for the deaf, dumb, and blind, orphan asylums, State penitentiary, and State agricultural experiment station. Other features of interest are the State Capitol, Hill Memorial Library, Elks' Home, city hall, post office, high school buildings, several monuments, and a national cemetery. Baton Rouge is a port of entry and, on account of its fine harbor, carries on a large shipping trade. It also has extensive manufacturing interests, including the largest southern refinery of the Standard Oil Company, oar, box, and brick factories, sugar refineries, artificial ice plant, and cottonseed oil and lumber mills. The city adopted the commission form of government in 1913. Pop., 1900, 11,269; 1910, 14,897; 1920, 21,782.

Baton Rouge was one of the earliest French settlements in Louisiana. At the beginning of the Revolution it was strongly garrisoned by the English, but in September, 1779, was taken by a large Spanish force under Governor Galvez. The city became the capital of the State in 1849, and on Jan. 26, 1861, the Louisiana ordinance of secession was adopted here. On Aug. 5, 1862, Baton Rouge was the scene of a fierce encounter between a Union force under Gen. Thomas Williams and a strong Confederate detachment under Gen. John C. Breckenridge, the latter being repulsed after two hours of severe fighting, though Williams lost his life.

**BATRACHIA,** bȧ-trā'ki-ȧ (Gk. *βάτραχος, batrachos,* frog). A word synonymous with Amphibia (q.v.).

**BATRACHOMYOMACHIA,** bät'rȧ-kō-mī'ō-mā'kĭ-ȧ (Gk. *βατραχομυομαχία,* Battle of Frogs and Mice, from *βάτραχος, batrachos,* frog + *μῦς, mys,* mouse + *μάχη, machē,* battle). A Greek mock-heroic poem, erroneously bearing the name of Homer. Plutarch said that its actual author was Pigres of Caria, brother of Queen Artemisia, who joined Xerxes in his invasion of Greece. The poem is a parody on the *Iliad,* in which the military preparations and contests of beasts, single combats, intervention of the gods, and other Homeric circumstances are described with much humor. Chief critical edition by Ludwich (Leipzig, 1896).

**BATSHIAN,** bät-shyän'. See BATJAN.

**BATTAKS,** bät'täks, or **BATTAS,** bät'täz. The natives of the northern interior of Sumatra. Physically they are somewhat darker, taller, and stronger than the coast Malays and are mesocephalic in head form. One of the most individual of East Indian peoples, they present marked contrasts of culture and seeming savagery. A well-developed village life, agriculture (even including a plow), cattle breeding of a notable sort, metal working (even gold weaving), and the arts of reading and writing, with an alphabet modified from the characters of the Asoka inscriptions (the writing is characteristically on pieces of bamboo, from bottom to top), flourish on the one hand; while on the other there exist debt slavery, permissive polygamy, exocannibalism, and man eating as a punitory institution, together with primitive ancestor and spirit worship, influenced, as the mythological names, etc., indicate, by Hindu sources. The house architecture of the Battaks, solider than the general Malay type, is a modification of the pile dwelling of a shore people, to suit the highlands, while in parts of the area the primitive tree house still survives. Their palisaded kampongs (villages) and other war devices are of interest. A collection of 60 views of houses, landscapes, natives, etc., from the Battak country was published in 1880 by the Penang Photographic Studio. In 1908 a "Battak Institute" was established at Leyden for the

study of the Battak country, people, etc. (the encouragement of agriculture and the spread of the use of the Dutch language among the Battaks were some of its objects). In 1909 a "Battak Society" was founded at Medan. Much is being done to advance the condition of the natives and their relations with European colonists. Since the account of the Battaks by Junghuhn in 1847 there have been several studies of this interesting Malay people, the chief of which are: Schreiber, *Die Battaländer in ihrem Verhaltnis zu den Malaien auf Sumatra* (Barmen, 1847); Brenner, *Besuch bei den Kannibalen Sumatras* (Würzburg, 1893); Modigliani, *Fra i Batacchi indipendenti* (Rome, 1892); Hagen, *Beiträge zur Kenntnis der Battareligion* (1882); Wameck, *Die Religion der Batak* (Leipzig, 1909); Volz, *Die Batakländer* (Berlin, 1909).

**BATTALION** (Fr. *bataillon;* for derivation, see BATTLE). INFANTRY. A separate body of men with a distinct organization, and generally the unit of command in the organization or manœuvring of an army. Originally the battalion was supposed to comprise the largest number of men, who, when drawn up in battle order, could hear the word of command or trumpet-call. The modern battle formation, and consequent army organization, is a direct result of the improved firearms with which modern infantry is equipped, the principle now underlying the strength of the battalion as a unit of command being generally the largest number of men capable of effective control as a unit in action. Modern expert military opinion, based on the experience of recent wars, would seem to indicate the necessity of still further reducing the strength of the unit of command in "attack" formation, a single company, when extended for "attack," covering over half a mile of ground. This, together with the fact that the present complement of officers is not enough to insure complete control, is a difficulty which increases with the battalion, and correspondingly with the strength of the battalion. It also is reflected in the difficulty of obtaining a rapid ammunition supply along the firing line and renders more arduous the task of the hospital corps and stretcher bearers. The reader is referred to the infantry drill regulations of the various armies.

In the United States regular army there are three battalions to a regiment, each commanded by a major. The following instances show the battalion strength in the armies of the greater European Powers:

*England.*—Battalion consists of 8 or 10 companies, corresponding in strength to the United States regiment.

*France.*—Battalion consists of 4 companies; 3 battalions to a regiment.

*Germany.*—Battalion consists of 544 men, raised in war to 1002, and divided into 4 companies. There are 3 battalions in a regiment.

*Russia.*—The battalion consists of 4 companies; the regiment of 4 battalions, or 17 companies in all, including the non-combatant company.

*Italy.*—Four companies to a battalion; 3 battalions to a regiment.

The name "battalion" is also given to engineers and various departmental corps, consisting of two or more companies. See ARMY ORGANIZATION; TACTICS, MILITARY; INFANTRY.

**BATTAS.** See BATTAKS.

**BATTENBERG,** bät'ten-berk (anciently, *Mons prisous Batavœ gentis,* ancient hill of the Batavian tribe). A town of Prussia in Hesse-Nassau, on the Eder, 15 miles north-northwest of Marburg. Before 1866 it belonged to Hesse-Cassel. The title of Prince of Battenberg dates from 1858, when it was conferred on the issue of a morganatic marriage of Prince Alexander of Hesse with the Countess von Hauke. Their second son, Prince Alexander, was called to occupy the throne of Bulgaria. (See ALEXANDER I.) Pop., 1900, 950.

**BATTENBERG,** HENRY MAURICE, PRINCE OF (1858–96). Son of Prince Alexander of Hesse by a morganatic marriage with the Countess von Hauke. In 1885 he married Princess Beatrice, youngest daughter of Queen Victoria. He took part in the Ashanti Expedition in 1895 and died of fever. His eldest daughter, Princess Victoria Ena, became the wife of Alfonso XIII of Spain in 1906.

**BATTENBERG,** LOUIS ALEXANDER, PRINCE OF (1854– ). A British prince and admiral, born at Gratz, Austria, and eldest son of Prince Alexander of Hesse. In 1868, having been naturalized as a British subject, he entered the Royal navy as a cadet. Promoted to be lieutenant in 1876, he was made commander in 1885 and captain in 1891. In the Egyptian War of 1882 he served with distinction. In 1884 he married his cousin, Princess Victoria, the daughter of Louis IV, Grand Duke of Hesse, and of Princess Alice, the daughter of Queen Victoria. From 1902 to 1904 he served as director of naval intelligence, and was then made rear-admiral with the command of the Second Cruiser Squadron. He was second in command of the Mediterranean Fleet from 1906 to 1908, commander-in-chief of the Atlantic Fleet from 1908 to 1910, and commander of the third and fourth divisions of the Home Fleet in 1911. He became Second Sea Lord (1911) and First Sea Lord (1912); upon his resignation (1914; see WAR IN EUROPE) he was made Privy Councilor.

**BAT'TERING-RAM'** (Eng. *batter,* Fr. *battre,* to strike). An engine of war used in ancient times and in the Middle Ages. It consisted of a beam of wood, with a mass of bronze or iron on one end, resembling the head of a ram (in Lat. *aries*). In its simplest form it was borne and impelled by the hands of the soldiers; afterward it was suspended in a frame and made to swing. Another form moved on rollers. The alternating motion was communicated by ropes. To protect those working it, a wooden roof (*testudo*) was constructed over it, and the whole was mounted on wheels. The beam of the ram varied from 60 to 120 feet in length, the head sometimes weighed above a ton, and as many as 100 men were at times employed in impelling the machine. When the blows were long enough continued, hardly any wall could resist. The besieged tried to drop stones on the testudo and on the ram itself, or to render it useless by catching it with grappling irons, or by undermining the testudo and the frame from which the ram was swung. When or where it was invented is unknown. It is mentioned by Ezekiel. The Romans received it from the Greeks.

**BAT'TERSEA** (St. Peter's Isle, from AS. *éj,* island). A metropolitan borough of Greater London (Map: London and Vicinity, E 6).

**BAT'TERSEA PARK.** A park of 185 acres in the southwestern part of London, on the Thames, laid out in 1852–58. It contains a subtropical garden of four acres, artificial lakes, and other attractions.

**BAT'TERSON,** Hermon Griswold (1827–1903). An American Episcopalian clergyman. He was born at Marbledale, Litchfield Co., Conn., and was educated privately. In 1860 he was ordained to the ministry. He was pastor of St. Mark's Church, at San Antonio, Tex., rector of Grace Church, Wabasha, Minn., of St. Clement's and of the Church of the Annunciation, Philadelphia, and of the Church of the Redeemer, New York. He was the author of several works, all of which have been frequently reprinted, such as the following: *The Missionary Tune-Book* (1868); *Christmas Carols and Other Verses* (1877); *Sketch-Book of the American Episcopate* (1876); *Pathway of Faith; Vesper Bells.*

**BAT'TERY** (Fr. *batterie,* from *battre,* Lat. *batuere,* to batter, beat). A term pertaining to the artillery arm of the military service. The armament pertaining to land forces may be conveniently divided into two classes: *fixed* and *movable.* The fixed armament consists of guns and mortars of various classes mounted on stationary carriages in groups of two or more of the same calibre and power, these groups being called "batteries." The term "battery" includes not only the work itself, with its slopes, guns, platforms, ammunition hoists, galleries, rooms, passages, and magazines, but also all material used in connection with the service of the pieces, and the *personnel* assigned to the work and its appurtenances. Such a battery in a coast fort is a *seacoast battery;* in any other fort a *fortification battery;* it may also be called a *mortar battery,* if composed of mortars; a *rapid-fire battery,* if composed of rapid-fire guns, etc.

Batteries are sometimes designated according to the purpose for which they are employed or the manner in which they are mounted as: *barbette battery,* if mounted *en barbette,* or so as to fire over a parapet; *blinded battery,* if protected by armored or bomb-proof defenses; *breaching battery,* one designed to make a breach in the enemy's defenses; *cavalier battery,* situated within the bastion (q.v.); *counter battery,* one designed to disable such guns of the defense as interfere with the breaching batteries; *enfilading* (q.v.) *batteries; floating battery; masked* or *fascine battery,* one concealed by fascines or other artificial device; *redan* (q.v.) *battery; sunken battery; water battery,* one close to high-water mark.

The movable armament consists of guns, mortars, and howitzers mounted on wheeled carriages on which they are transported and from which they are fired, or of guns carried on the backs of animals. Groups of guns used in an attack on a fortified place, which is being besieged, become *siege batteries.* These are usually composed of the heaviest guns designed to be habitually transported from place to place with an army in the field and are therefore the least mobile and most restricted in their movements. The *matériel* for siege batteries in the United States army are in the hands of coast artillery companies, but batteries are not organized as such until actual operations demand their use. *Field batteries* consist of four or more guns with full equipment of men, horses, carriages, caissons, etc., designed and organized for service with troops in the field. *Horse artillery batteries* are the most mobile of all and act with the cavalry. In this the gunners are mounted. *Mountain, mule, bullock,* or *elephant batteries* consist of guns and carriages so constructed that they may be taken apart and transported on the backs of animals, the gun ordinarily forming a load for one animal—the carriage for one or more; but sometimes a *jointed* gun is used which is carried by two or more animals. (See Mountain Artillery.) Movable batteries are organized into battalions, regiments, brigades, etc., while fixed batteries are units of combat in themselves or are organized into *fire commands* and *battle commands.*

Battery, in a naval sense, is used to denote all the guns of a ship; all the guns on one side, as the *starboard battery,* the *port battery;* a certain part of the guns, as the *gun-deck battery, rapid-fire battery, six-inch battery;* all the heavy guns, those of 8″ calibre and upward, constitute *the main battery;* all smaller rapid-fire guns, the *secondary battery,* etc. See Artillery; Coast Artillery; Field Artillery; Cannon; Siege Guns; Armor Plate; Fortification; Ships, Armored; Tactics, Military.

**BATTERY.** See Assault and Battery.

**BATTERY** (in electricity). See Voltaic Cell; Galvanic Battery; Electricity.

**BATTERY,** The. A tract of 21 acres forming the southern point of the city of New York, the site of fortifications erected by the Dutch, and later a public park. In the early history of the city the north side of the Battery was lined with the most aristocratic residences. The view of the rivers and bay from the Battery wall is unsurpassed, and the park is still a much-frequented pleasure ground, though much disfigured by the elevated railroads which cross it. The park contains the Barge Office, Castle Garden, now the Aquarium, and a statue of Giovanni da Verrazano, who is believed to have reached the mouth of the Hudson River in 1554, though it remained for Hudson to demonstrate the extent and importance of the river.

**BATTEUX,** bȧ'tœ', Charles (1713–80). A French philosopher and writer on æsthetics. He was born at Alland'huy, near Vouziers (Ardennes), and studied theology at Rheims. Upon his ordination as priest he went to Paris, where he became professor of Greek and Latin philosophy at the Collège de France. His works, chiefly on æsthetics, enunciate the principle that art is not an imitation of nature as such, but of the element of the beautiful in nature, the faithful imitation or interpretation of which is regulated by the innate sense of taste. This theory (*Theorie der schönen Künste*) may be traced in *Cours de belles-lettres* (5 vols., 1765), a later edition of which appeared under the title of *Principes abrégés de la littérature* (6 vols., 1824). This work is an amplification of an earlier work entitled *Les beaux-arts réduits à un même principe* (1746).

**BATTHYÁNYI,** bŏt'yă-nyē. A celebrated Hungarian family. It traces its origin back to a companion of Arpád, the Magyar invader of Hungary (about 894). It has given to Hungary many warriors and statesmen. The surname is derived from lands obtained in the fourteenth century.—Francis Batthyányi (died 1566) distinguished himself at the battle of Mohács, 1526.—Balthazar Batthyányi, who was the head of the family in the latter half of the sixteenth century, fought with distinction in the Turkish wars.—Prince Charles Batthyányi, a lieutenant field marshal of the empire, distinguished himself in the Austrian War of Succession, particularly by a victory over the French and Bavarians at Pfaffenhofen, on April 15, 1745.—Count Casimir Batthyányi, a mem-

ber of the principal branch of the family, was born June 4, 1807. He was Minister of Foreign Affairs in Hungary during the Revolution of 1848–49, in which he also distinguished himself as a military governor. After the triumph of the Austrians, he fled with Kossuth into Turkish territory, where he remained until 1851. He then went to France, and died in Paris, July 13, 1854.—Count LOUIS BATTHYÁNYI, belonging to another branch of the same family, and born at Presburg in 1809, espoused the national cause, yet sought to maintain the connection with Austria and his allegiance to the Austrian sovereign. He was appointed President of the Ministry when Hungary obtained a ministry of its own, in March, 1848. When the breach between Hungary and the Hapsburgs widened into open war, he resigned and afterward took part in public affairs, chiefly as a member of the Diet. After the Austrians entered Pesth he was arrested, in January, 1849, and on October 6 was executed. Consult Horváth, *Graf Ludwig Batthyányi* (Hamburg, 1850).

**BATTI'ADÆ** (Gk. *Βαττιάδαι, Battiadai*, descendants of Battus). Kings of Cyrene for eight generations. 1. BATTUS I, founder and first King of the Greek colony of Cyrene in Libya. He came from the island of Thera and was directed to the site of Cyrene by the Delphic oracle. The generally accepted date—not historically certain—of the settlement is about 630 B.C. Battus I ruled 40 years, according to Herodotus. 2. ARCESILAUS I, son of Battus I, and second King of Cyrene. According to Herodotus, he ruled 16 years. 3. BATTUS II (called "The Blessed," or "The Wealthy," Ὁ Εὐδαίμων, son of Arcesilaus I, and third King of Cyrene. In his reign immigrants were invited from Peloponnesus, Crete, and elsewhere, under the promise of a new division of lands. These lands were taken from the Libyans, who turned for aid to the Egyptian King, Apries. A battle was fought in 570 B.C. at Irasa, in which the Cyrenæans were victorious. Cyrene now increased greatly in power and importance. 4. ARCESILAUS II (called "The Oppressive," Ὁ Χαλεπός), son of Battus II, whom he succeeded on the throne. He began to rule, according to Herodotus, about 560 B.C. Dissensions arose between him and his brothers, in consequence of which the latter withdrew from Cyrene and founded Barca. He met with a severe defeat at the hands of the Libyans and was finally murdered by his brother Haliarchus, or Learchus (550 B.C.). His murder was afterward avenged by his wife, Eryxo. 5. BATTUS III (called "The Lame," Ὁ Χωλός), son and successor of the preceding. In his reign the Cyrenæans, despairing of the condition of the state, invited, by advice of the Delphic oracle, Demonax of Mantinea to their city to govern their affairs. At this time under his guidance a constitution was framed, by which the powers and privileges of the King were greatly curtailed. 6. ARCESILAUS III, son and successor of Battus III. Attempting to overthrow the power of Demonax, he was unsuccessful and fled to Samos. He there, with the help of Polycrates, collected a large army and, returning to Cyrene, wreaked terrible vengeance on his enemies. After Cambyses had subjugated Egypt, Arcesilaus submitted to the Persian King. Afterward he withdrew to Barca and was there slain by the King, Alazir. His death was avenged by his mother. 7. BATTUS IV, son of the preceding, and seventh King of Cyrene. 8. ARCESILAUS IV, son and successor of Battus IV, was the last King of Cyrene. He won a chariot race at the Pythian Games in 462 B.C. and is celebrated therefor in Pindar's fourth and fifth Pythian odes. He is also said to have won a victory at the Olympic Games in 460 B.C. Shortly after this a revolution broke out at Cyrene, and he fled to Euhesperides and was there slain.

**BAT TICKS.** See FOREST FLY.

**BATTLE** (Fr. *bataille*, from Lat. *batuere*, to beat, strike). An engagement or combat between opposing military bodies. All strategic operations in war must culminate in the *battle*, for that alone can give them significance. Whether a commander will attack or fight a defensive battle depends on the previous strategical and tactical operations, on the general plans of the commander-in-chief, and on the condition and the particular situation in which his army finds itself at the time it meets the adversary. The tactical offensive is usually preferred as promising more decisive results; but the tactical defensive is often forced on an army. When the hostile armies meet, the commander of the column in question is properly with the advance guard (q.v.). The leading battalion forms line of company, columns of sections, and advances with a light skirmish line in front; the engineers and bridge train halt, and the battery of the advance guard takes up a preparatory position.

A *defensive* battle may be purely defensive, or (the usual case) it may be only temporarily defensive, its object being to gain time. The first consideration is a good position, and this must be carefully intrenched, provided there is time; but all intrenchments should be entirely hidden from the enemy. This position is not occupied at the beginning, but the troops are first assembled in a preparatory position. The positions available for the artillery usually decide the grouping of the forces, except in covered country, when the infantry line has the preference, and the artillery finds positions in rear. As the battle advances, it takes more and more the character of a truly offensive action. Retreats are difficult, even when voluntary. When night intervenes after the battle, a considerable distance may be placed between the two forces and the units somewhat reorganized. The artillery usually furnishes the first support against pursuit, and it is protected by the cavalry, and this leads gradually to the formation of a rear guard.

Reference should be made to the article TACTICS, MILITARY, where will be found an account of the strategy and tactics used in active military operations, including a complete bibliography. That article also discusses the tactics peculiar to the various arms. See ARMY ORGANIZATION; ADVANCE GUARD; ATTACK; RECONNAISSANCE; COAST DEFENSE; FORTIFICATION; OUTPOST; ETC.

**BATTLE, TRIAL BY, or WAGER OF.** The determination of a controversy by a physical combat, conducted in the presence of judges and according to fixed judicial rules. Although "it prevails among all the races from which Britain derived its Teutonic blood," it was not a legal institution of Anglo-Saxon England, but was introduced into Britain by William the Conqueror. Sir James Fitzjames Stephen has expressed the opinion that "trial by battle was only private war under regulations." This view is rejected by Pollock and Maitland, however, as well as by other writers, who consider it a

social process for the discovery of the truth. "What triumphed was not brute force, but the truth. The combatant who was worsted was a convicted perjurer." Such was the theory underlying this form of trial.

It was employed both in criminal and civil controversies, but by Bracton's time it was limited to appeals of felony in criminal cases and to the writ of right in civil cases. In the former the combat was between the prosecutor of the felony and the alleged felon, unless one or the other was of unfit age or sex, where his or her place might be taken by a champion. In the civil proceeding by writ of right (the final remedy by a claimant of real property who could not rely on recent possession), either party could appear by champion. This led to the use of professional pugilists and to the business of training and keeping such champions for hire. By the time of Edward I any defendant to whom trial by battle was offered could decline and demand a trial by jury. On the other hand, the defendant, at least in an appeal of felony, retained the legal right to compel his prosecutor to do battle, until 1819, when the Statute of 59 George III, c. 46, enacted that "all appeals of treason, murder, felony, or other offenses shall cease," and that there should be no wager of battle either in criminal or civil controversies. Attempts had been made during the reigns of James I and Charles I to abolish trial by battle, but without success, and its abolition in 1819 was due to the decision of the Court of King's Bench, in Ashford *v.* Thornton (reported in 1 Barnewall and Alderson, 405) that the defendant in an appeal of felony, who had demanded trial by battle, was entitled to it as "his lawful mode of trial." In Scotland this mode of trial came to an end late in the sixteenth century, and throughout Britain it was practically obsolete from that time. Consult: Stephen, *History of the Criminal Law of England* (London, 1883); Pollock and Maitland, *History of English Law* (2d ed. Boston, 1899); Neilson, *Trial by Combat* (London, 1890).

**BATTLE.** A market town of Sussex, England, 7 miles northwest of Hastings (Map: England, G 6). Pop., 1901, 2991; 1911, 2924. Its name and title to distinction arise from the celebrated Battle Abbey, founded by William the Conqueror to commemorate his victory over Harold, the Saxon King, in 1066. Although generally called the Battle of Hastings (q.v.), the conflict took place on Senlac Hill (now Battle Hill), and the abbey is supposed to mark the spot where Harold fell. At the Reformation the abbey was converted into a private residential mansion; it is open to visitors once a week. The "Roll of Battle Abbey" contained a list of the Norman nobles in the suite of the Conqueror. It was formerly deposited in the abbey and was destroyed in the burning of Cowdray House in 1793. Ten copies exist, but the "roll" is considered to have been of apocryphal origin. Consult: Walcott, *History of Battle Abbey* (London, 1867); Hawthorne, *English Note-Books* (Boston, 1870); Duchess of Cleveland, *The Roll of Battle Abbey* (London, 1889).

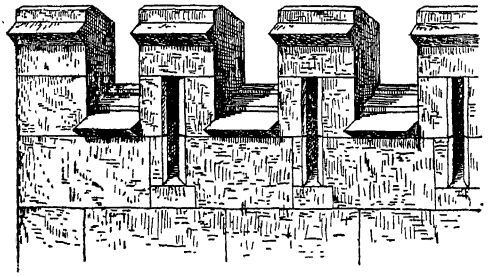
**BATTLE ABOVE THE CLOUDS, THE.** In United States history, the name applied to that part of the battle of Chattanooga which resulted in the capture of Lookout Mountain by General Hooker, Nov. 24, 1863. See CHATTANOOGA, BATTLE OF.

**BAT'TLE CREEK.** A city in Calhoun Co., Mich., 121 miles by rail west of Detroit; at the confluence of the Kalamazoo River with Battle Creek, and on the Michigan Central and the Chicago and Grand Trunk railroads (Map: Michigan, D 6). The public-school library (20,000 vols.) occupies a fine building. Other prominent structures include the post office, the central school and city hall buildings, the Sanitarium, Post Tavern, Post Building, Ward Building, and Post Theatre. There are four parks, one of which, at Goguac Lake, is a popular summer resort, and a school museum. The city was formerly the headquarters of the Seventh-Day Adventist denomination, which still maintains here a widely known sanitarium, with a hospital and dormitory, homes for children and the aged, and a college. The tabernacle of this denomination has an auditorium with a seating capacity of 3500, one of the largest ecclesiastical halls in the State. Battle Creek is the centre of a fertile agricultural district and controls a considerable trade in the products of the region, principally grain, fruit, live stock, and wool, as well as in its most important manufactured products; threshing machines and other agricultural implements, pumps, engines, flour, printing presses, and hose fixtures. The city enjoys a national reputation for its cereal foods. The repair shops of the Chicago and Grand Trunk Railroad are situated here. Manufacturing interests are promoted by excellent water power. Settled about 1835, Battle Creek was incorporated as a village in 1850, and nine years later received a city charter. It adopted the commission form of government in 1913. The water works are the property of the municipality. Pop., 1890, 13,197; 1900, 18,563; 1910, 25,267; 1920, 36,164.

**BAT'TLEFORD.** A trading town in the province of Saskatchewan, Canada, at the confluence of the Saskatchewan and Battle rivers, and on the Canadian Northern and Grand Trunk Pacific railroads (Map: Northwest Territories, H 4). It is the centre and supply station for a large farming and grazing district, is the headquarters for a troop of Canadian mounted police, and is the seat of an Indian Agency. From 1876 to 1883 this town was the capital of the Northwest Territories. Pop., 1901, 797; 1906, 800; 1911, 1335.

**BAT'TLE HYMN OF THE REPUB'LIC, THE.** A stirring poem by Julia Ward Howe (1862), published in the *Atlantic Monthly*. The music is that of the song, "John Brown's Body."

**BAT'TLEMENT** (evidently from unrecorded OF. **bastillement*, from OF. *bastiller*, to fortify,



BATTLEMENT.

*bastir*, Fr. *bâtir*, to build; cf. *bastille*, fortress). A term describing the parapet of mediæval de-

fensive towers and walls. The parapet is formed by a number of rising parts known as *cops* or *merlons*, the intervening spaces called *crevelles*. The soldier would take shelter behind the *merlon*, while he fired through the *crevelle*. Good examples are found on the towers of old castles throughout Europe; and on churches, armories, and other public buildings in the United States, where they are employed for their architectural value.

**BATTLE MON'UMENT.** 1. An abbey erected on the site of the battle of Hastings by William the Conqueror. The remains of it exist to this day. 2. A monument, 72 feet high, erected in 1815, at Baltimore, Md., in memory of those who defended the city against the British in September, 1814.

**BATTLE OF HAST'INGS.** See HASTINGS, BATTLE OF.

**BATTLE OF IS'SUS, THE.** A battle fought 333 B.C., in which Alexander defeated Darius, King of Persia, with great loss. The Persian Queen and her family were captured. The Macedonian loss was estimated to be only 300 foot and 100 horse. The battle was made the subject of a famous mosaic, which was once in the House of the Faun at Pompeii and is now preserved at the Museo Nazionale, Naples. For the mosaic, consult Mau-Kelsey, *Pompeii* (New York, 1902). See ALEXANDER THE GREAT.

**BATTLE OF SHARPSBURG.** See ANTIETAM, BATTLE OF.

**BATTLE OF THE BAL'TIC.** See COPENHAGEN.

**BATTLE OF THE BOOKS.** The title of a famous book by Jonathan Swift, which grew out of the controversy over the comparative merits of ancient and modern literature. The controversy was started in France by Charles Perrault (q.v.). In 1687 he read before the Academy a poem called *Le siècle de Louis le Grand*, in which he aroused the classicists by placing the moderns above the ancients. He was assailed by Boileau in *Réflexions sur Longin* (1693) and in other works. Perrault subsequently elaborated his position in the *Parallèle des anciens et des modernes* (1688–96). The dispute was taken up by English scholars. Sir William Temple sided with the ancients, and William Wotton to some degree with the moderns. The dispute developed into a literary controversy over the Epistles of Phalaris, in which Dr. Bentley showed his learning at the expense of Charles Boyle. Swift burlesqued the whole affair by giving a "full and true account of the battle fought last Friday between the ancient and modern books in Saint James's Library," of which Richard Bentley was librarian. See BENTLEY, RICHARD.

**BATTLE OF THE FROGS AND MICE.** See BATRACHOMYOMACHIA.

**BATTLE OF THE KEGS.** See HOPKINSON, FRANCIS.

**BATTLE OF THE SPURS.** See COURTRAI; GUINEGATE.

**BATTLESHIP.** In old naval parlance a line-of-battle ship was a vessel carrying batteries of guns on two or more covered decks and intended, in a fleet action, to lie in the line of battle. The modern battleship is a vessel of war in which are combined the greatest possible offensive and defensive powers and as great speed as can be given without serious reduction of these powers. The development of the modern battleship will be found under SHIPS, ARMORED; for other information concerning it, see NAVIES; CRUISER; UNITED STATES, *Navy;* FRIGATE; ETC.

**BATTONI,** bät-tō'nē. See BATONI, POMPEO.

**BATTONYA,** bŏt'tō-nyŏ. A market town of the county of Csanád, Hungary, about 60 miles east of Szegedin. Its principal industries are connected with the production of tobacco and wine, and the cattle raising of the district (Map: Hungary, G 3). Pop., 1910, 13,011.

**BATTUE,** băt'tū (Fr. from *battre*, to beat, strike). The method adopted in many parts of the world for driving wild animals to a point where the huntsman is secreted ready to kill them. Specifically, battue means to-day the spreading of beaters over the moors of Scotland, Ireland, and the north of England in a wide circle and gathering them to a narrower one, whereby the grouse are driven past groups of gunners and shot at from cover. Similar tactics are employed with partridge, particularly in the open lands of the east of England; and the woods and coppices in England are beaten to drive the pheasants out of the timber and undergrowth and over the guns stationed on the adjacent pastures. In India modifications of this method are used in tiger hunting, and in driving elephants into inclosures from which they cannot escape. In Patagonia the natives surround the guanacos in the same way.

In Australia rabbit driving has been frequently resorted to in regions where the animal has become a pest, and the same applies to certain of the western United States, where wolf driving is also practiced when necessary. Generally speaking, the driving of game in the European fashion is considered unsportsmanlike in America, this sentiment being reflected by the prohibition in most States of the hounding of deer. See HUNTING.

**BAT'TUS.** See BATTIADÆ.

**BATUA.** See BATWA.

**BATU KHAN,** bä-tōō'kän (?–1256). The leader of the Mongols in their invasion of Europe in the thirteenth century, grandson of Genghis Khan and nephew of Ogotai Khan. Given command in 1235 of the Mongol army destined against Europe, he marched westward, crossed the Volga River, and dividing his forces sent one southward to bring the Bulgarians to submission, while with the main army he advanced into the heart of Russia. On Dec. 21, 1237, he assaulted and took the city of Riazan. After this he captured Moscow, Vladimir, and, in 1240, Kiev, his followers everywhere perpetrating horrible atrocities. "The villages disappeared, and the heads of the Russians fell like grass before the sickle." The Russian princes were forced to bow to the Mongol yoke. In 1241 Batu Khan advanced into Hungary and overwhelmed the army of Béla IV. At the same time another Mongol army advanced against the Poles. It ravaged Poland and destroyed Cracow. On the memorable field of the Wahlstatt, near Liegnitz, the forces of the Silesian duke and the Teutonic knights succumbed to the Mongols, who, however, were unable to pursue their progress owing to their heavy losses. From the German frontier to the Volga, hardly a town survived the passage of this tornado of war. In 1242 Batu Khan was recalled to Asia by the news of the death of Ogotai. He died in 1256 in the midst of preparation for further conquests. In his campaigns Batu's main army was preceded by a body of 40,000 men, who cut roads and acted as pioneers through the terribly diffi-

cult country. The secret of the military success of the Mongols was the incredible speed with which they marched, often covering, it was said, a distance of nearly 300 miles in three days. The khanate which Batu governed was Kiptchak, a region extending from the Jaxartes in Turkestan to the limits of Russia of the thirteenth century and comprising the region north of the Caucasus. Batu's army was named the Golden Horde (q.v.), because of his tent, which was richly covered with embroidery and gilded leather. The *sira ordu*, or silken palace, made the great encampment by the Volga known as Sarai, the capital of the Golden Horde. The cause of the Mongol success lay in the fact that the whole Tatar nation was a standing army, which struck Europe in a time of feudalism, when patriotism was parochial, Russia without national unity, only the nobles and free men armed, and the number of monks, hired servants, and slaves in overwhelming majority. On the other hand, the Tatar cavalry was superbly disciplined, with admirable tactics, while their weapons were far superior to anything then known in Europe. Their arrows were longer and heavier, and their engineering skill far in advance of that of their foes. Their horses were of the Tatar breed, which could find food for themselves by brushing the snow away with their noses, where Western horses would starve. Consult: Howorth, *History of the Mongols* (London, 1880); Hammer-Purgstall, *Geschichte der Goldenen Horde in Kiptschack* (Pesth, 1840); Banking, *Wars of the Mongols* (London, 1827).

**BATUM,** bȧ-to͞om′, or **BATOUM.** Formerly a Turkish fortified city, now a Russian port in the province of Batum (area, 2700 square miles; pop., 1911, 166,300), on the southeastern shore of the Black Sea, about 8 miles north of the Turkish frontier (Map: Russia, F 6). The Berlin Congress of 1878, in sanctioning the cession of Batum to Russia, stipulated that it should not be made into a naval station, but should remain an essentially commercial port. It remained a free port until 1886. After the collapse of a quay in 1911 extensive improvements have made the harbor one of the best on the east coast of the Black Sea, and the city is a naval station. The climate is warm and mild, almost tropical; lemons, oranges, camelias, and even palms thrive in the open air. The city has but few well-appointed houses, and its sanitary conditions are very imperfect, but there is a fine park, and a cathedral completed in 1903. An extensive trade is carried on, Batum being a great emporium for the export of petroleum, which is extensively transported by means of pipe lines and tank cars. Other articles of commerce are petroleum products, wool, timber, tin plate, bricks, wheat, manganese ore, and articles from Transcaucasia. It is the seat of a United States consul. Pop., 1889, 23,200; 1897, 28,509; 1911, 30,008, composed chiefly of Russians, Turks, Greeks, Armenians, and Persians.

**BATWA,** bät′wȧ. A pigmy tribe in the mountainous country of the Wissmann Falls district, southern Central Africa. According to Verner, they are sometimes less than 4 feet high; their heads are small and well shaped, their eyes small, bright, and deeply set, and their color chocolate; they are trimly built and symmetrical, with leg muscles well developed, and arms less so; the feet and hands are small and well formed; the hair is kinky, and there is no beard. The villages are not regularly laid out; the houses are beehive-shape. The Batwa are under the protection of the Bakuba, who have taught them to cultivate a few vegetables. They are by habit meat eaters. In addition larvæ of insects and wild roots are eaten. Their weapons are bows, arrows, and knives. The boys are taught to hunt, and the girls dig edible roots. Household furniture consists of a few Bakuba earthern pots, a bed of sticks woven together, baskets, quivers, nets, and bamboo fish traps. They do not make pottery, weave, or work metals, and have no musical instruments. The bruised root of a species of Euphorbia furnishes arrow poison. Their knowledge of the habits of wild animals is remarkable, and sight, smell, and hearing are well developed. They are monogamous and faithful and affectionate toward their children. Charms and amulets are worn. In their funeral customs the men abstain from hunting and dancing, while the women remain in the huts and weep. The name "Batwa," also written "Batua," has in addition a much wider application, being used of a considerable number of different pigmy tribes, especially those sprinkled over the Congo region. Native usage of the term has, however, occasionally produced confusion, inasmuch as tribes shorter than the speakers are designated as Batwa without necessarily falling into the category of pigmies.

**BATYUSHKOV,** bä′tūsh-kŏf, KONSTANTIN NIKOLAYEVITCH (1787–1855). A famous Russian elegiac poet, the forerunner of Pushkin. He was born at Vologda and educated at St. Petersburg. Here he mastered the Italian, German, and French languages and very early began to write poetry. He entered the military service; took part in 1807 in the Niemen campaign; later was in Finland, and entered Paris with the Army of the Allies in 1814. His unbounded admiration for Voltaire and France had received a rude shock when Moscow was burned by "the modern Vandals"; but the sight of Paris made him forget it all, and he immediately went to Voltaire's grave. In 1818 he was appointed attaché of the Russian Embassy at Naples, and the dream of his life—to visit sunny Italy—was realized; but his happiness did not last long. In 1822, after years of mental aberration, he fell a victim to a brain disease. In addition to his elegies, of which *The Death of Tasso* is perhaps his chief, his original works include epistles and narrative and lyric poems. He also made excellent translations from the Latin of Tibullus, the French of Parny, the Italian of Petrarch, and the German of Matthisson. His whole life was devoted to the formal perfection of Russian poetry—a struggle from which he came out victorious—so that he is the real teacher of Pushkin in this respect. His prose includes essays on poetry, ethics, and religion. (*On the Influence of Lighter Poetry upon Language* and *A Word about Morals Based on Religion* are two of his titles.) The first collection of his works appeared as early as 1817, when the author was barely 30, under the title, *Experiments in Verse and Prose.* Complete editions were published in 1834 and 1850. The best edition of his works is that by his brother, P. N. Batyushkov (3 vols., St. Petersburg, 1877), with an exhaustive biography by L. N. Maykoff and commentaries by the latter and V. I. Saitov.

**BAUAN,** bou'ân, or **BAUANG,** bou'âng. A town of Luzon, Philippines, in the province of Batangas (Map: Luzon, F 12). It is situated at the head of Batangas Bay, 4 miles northwest of Batangas, the capital of the province. The town manufactures piña cloth embroidery and is a centre for the marketing of agricultural products. Pop., 1903, 39,094.

**BAU'BO** (Gk. *Bavβώ, Baubō*). A mythical woman of Eleusis, whom Hesychius calls "the Nurse of Demeter" and about whom there are many stories. These seem to have been the inventions of later times, coined for the purpose of giving a mythical origin to the jokes in which women used to indulge at the festival of Demeter. She was in some way connected with the Eleusinian Mysteries and is introduced by Goethe into the second part of *Faust* as the type of feminine lust.

**BAUCHER,** bō'shâ', FRANÇOIS (1796–1873). A French hippologist, born in Versailles. He published a new system of equestrian training, under the title of *Méthode d'équitation basée sur des nouveaux principes* (1842)—a unique work, which occasioned considerable comment and which has been translated into several European languages (Eng. trans. under the title *A New Method of Horsemanship*, Philadelphia, 1856). Under Napoleon III Baucher was appointed to a position in the Imperial *manège*.

**BAU'CIS.** See PHILEMON AND BAUCIS.

**BAUDELAIRE,** bōd'lâr', CHARLES (1821–67). A French poet, born in Paris, April 9, 1821. He was the forerunner of the decadent and even degenerate school in modern French poetry, and in his kind greater than any of his successors. His parents sought to turn him from literature by travel in the Orient, and, as might have been foreseen, confirmed him in his perversity. The imagery, the colors, the odors of those scenes, that splendid nature, new and strange, fired his eccentric imagination and seemed to command a poetic expression. Yet at first this morbid hyperæsthesia, which was to rise at times to emotional hysteria, was controlled by a strong critical bent. Baudelaire's early essays show remarkable keenness and prescience in regard to the trend of lyric poetry, and his translations of Poe's *Tales* (1856) made that author almost as much a classic of French as of American romantic fiction. But Baudelaire's cardinal work in French literature is the *Fleurs du Mal* (Flowers of Evil), 1857, in which the restless reaction from the confident outlook of scientific determinism finds its first, its most morbidly pessimistic, and possibly its strongest expression. Baudelaire lived for 10 years longer, "cultivating hysteria with delight and terror," as he tells us, and died in a hospital at last after a year of semi-lunacy induced by the excessive use of nervous stimulants. Baudelaire's topsy-turvy ethics regard nature as evil, the natural as ugly, decay as a release, and death as a blessing. Possibly he was insincere; certainly he was intentionally brutal, and strained after effects in "the last convulsions of expiring individualism," as though drunk with the lees of romantic wine. There are 151 of these rank night-shade *Flowers*, all short poems, compactly built, with a mastery of technique unsurpassed in France, carefully polished and elaborated moral paradoxes, in which a shuddering at the vileness of life alternates with futile aspirations for an emancipation from it. In this respect he is the predecessor of Paul Verlaine (q.v.), of whom it has been said: "He often sat down, reeking with the odors of the foulest of Parisian *gargotes*, to pour out in verse of almost superhuman sweetness the aspirations of a soul profoundly touched with religious yearning." And what Baudelaire was as a poet, that Joris-Karl Huysmans was as a writer of remarkable prose. (See HUYSMANS, J. K.) Even while Beaudelaire worshiped Satan, he clung to the Cross and became towards the close of his life as morosely ascetic in resolution as he was extravagantly hedonistic in action. In his prose, as in his verse, the philosophy of science and the ethics of materialism coexist with the mysticism of mediæval demonology. His ethics are pessimism reduced to the absurd, his æsthetics are a reduction to the absurd of art; yet his poetry, in spite of all its artistic theory and ethical teaching, has a perverse poisonous originality that like arsenic preserves his memory green. The *Fleurs du Mal* have scattered their seeds wide, and Baudelaire is often called the father of the decadent Symbolists. Baudelaire's known works were published in 7 vols. (Paris, 1868); but certain poems that were suppressed under this Empire appeared in a recension by Mallarmé, *Le Tombeau de Ch. Baudelaire* (Paris, 1896); while the Vicomte de Louvenjoul (q.v.) edited the curious revelation *Mon Cœur Mis à Nu* (Paris, 1908). A considerable literature has sprung up around the life and writings of Baudelaire, and it is possible here to mention only the most important works, such as Henry James, *French Poets and Novelists* (London, 1884); Asselineau, *Ch. Baudelaire: sa vie et son œuvre* (Paris, 1889); G. Kahn, *Les Symbolistes et les Décadents* (Paris, 1902); F. Gautier, *Ch. Baudelaire* (last ed., Brussels, 1904); and the essays by Paul Bourget. Several attempts have been made to render some of the *Fleurs du Mal* into English verse, the most successful being that of A. Symons (London, 1905). One should also read the strangely morbid yet fascinating picture of Baudelaire given by Huysmans in the character of Des Esseintes in *A Rebours* (Eng. trans., London, 1897). See also MALLARMÉ, STÉPHANE; and FRENCH LITERATURE.

**BAUDENS,** bō'dăN', JEAN BAPTISTE LUCIEN (1804–57). A French surgeon. He was born at Aire, in the department of Pas-de-Calais, and studied at the medical school in Paris. In 1823 he became connected with the hospital at Lille and afterward lived in Strassburg. In 1826 he was made a surgeon to the military hospital in Paris, and from 1830 acted as army surgeon at Algiers, where he founded a hospital for instruction. His writings include: *Clinique des plaies d'armes à feu* (1836) and *Nouvelle méthode des amputations* (1842). His original contributions consisted mainly in improvements of the surgical treatment of bullet wounds.

**BAUDHAYANA,** boud-hä'yȧ-nȧ. An early Hindu teacher or lawgiver. See APASTAMBA; GAUTAMA; VASISHTA.

**BAUDIN,** bō'dăN', CHARLES (1784–1854). A French admiral, born at Sedan. In an engagement fought in Indian waters between the French ship *Sémillante* and the English frigate *Terpsichore* in 1808 he lost an arm and was shortly afterward promoted lieutenant of the vessel. In June, 1812, while convoying a fleet of 12 French transports laden with ammunition to Toulon, he was pursued by English cruisers, but effected his escape and subsequently inflicted heavy damage upon a brig attached to the Eng-

lish squadron. After the battle of Waterloo Baudin volunteered to conduct the Emperor successfully through the cordon of English cruisers that guarded the coast of France. He was appointed rear-admiral in 1838, was intrusted with the command of the fleet of 23 vessels sent against Mexico, and on Nov. 27, 1838, bombarded San Juan de Ulúa, the defenses of Vera Cruz, which capitulated the following day. He retired from active service in 1849.

**BAUDISSIN,** bou'dĭs-sĭn, *Fr. pron.* bō'dē'-săN', WOLF HEINRICH, GRAF VON (1789–1878). A German translator, born at Rantzau, in Holstein. He entered the diplomatic service of Denmark in 1810, and became Secretary of Legation successively at Stockholm, Vienna, and Paris. In 1827 he settled at Dresden, where he collaborated with Tieck in his famous German translation of Shakespeare. The following plays were translated by Baudissin and were revised and annotated by Tieck: *Othello; King Lear; Much Ado About Nothing; Comedy of Errors; Taming of the Shrew; Measure for Measure; All's Well that Ends Well; Troilus and Cressida; Love's Labor's Lost; Merry Wives of Windsor; Titus Andronicus; Antony and Cleopatra.* Among Baudissin's other German translations are Hartmann's *Iwein* and the comedies of Molière (4 vols., 1865–67).

**BAUDISSIN,** WOLF WILHELM, GRAF VON (1847– ). A German theologian, born at Sophienhof, Holstein. He studied at Berlin, Erlangen, Leipzig, and Kiel, and was professor at Strassburg from 1876 to 1881. From 1881 to 1900 he was professor at Marburg and in the latter year was called to Berlin. He published: *Translationis Antiquæ Arabicæ Libri Jobi quæ Supersunt* (1870); *Studien zur semitischen Religionsgeschichte* (1876–78); *Die Geschichte des alttestamentlichen Priesterthums untersucht* (1889); *August Dillmann* (1895); *Einleitung in die Bücher des Alten Testamentes* (1901); *Adonis und Esmun, eine Untersuchung zur Geschichte des Glaubens an Auferstehungsgotter und an Heilgotter* (1911).

**BAUDRICK.** See BALDRIC.

**BAUDRILLART,** bō'drē'yär', HENRI JOSEPH LÉON (1821–92). A French political economist and author. He was born in Paris, studied at the Collège Bourbon, and after 1855 was editor of the *Journal des Economistes.* In 1866 he was appointed professor of history and political economy in the Collège de France, in 1869 general inspector of libraries, and in 1881 a professor in the Ecole des Ponts et Chaussées. He published *Manuel d'économie politique* (1857), *Les populations agricoles de la France* (1880–88), and other works.

**BAUDRY,** bō'drē', PAUL JACQUES AIMÉ (1828–86). A French decorative, figure, and portrait painter. He was born at La Roche-sur-Yon, Vendée, and studied with Drölling in the Ecole des Beaux-Arts, Paris, whither he was sent with a stipend from his native city. Having won the Grand Prix in 1850, he studied in Rome, forming himself especially after the great Venetian masters. After his return he speedily rose to the front rank among contemporaneous artists, became a member of the Institute in 1870, and commander of the Legion of Honor in 1875. He first distinguished himself in figure and portrait painting. One of his most charming figure pieces is the "Pearl and the Wave," and he is represented in the Musée de Luxembourg by "Fate and the Child" and "Truth" and by canvases in several of the provincial museums of France. Among his sitters were many prominent representatives of art, literature, and finance and of the aristocracy of France, but he is most celebrated as a decorative painter, his works in the grand foyer of the Opera House in Paris (1866–74) ranking among the most brilliant creations of modern art. His masterpiece, however, is "The Glorification of the Law," adorning the ceiling in the Palace of Justice, which brought him the Medal of Honor in 1881. Consult Charles Ephrussi, *Paul Baudry, sa vie et son œuvre* (Paris, 1887).

**BAUER,** bou'ĕr, ADOLF (1855– ). An Austrian classical scholar, born at Prague. He studied at the universities of Vienna, Berlin, and Bonn, and in 1891 was appointed professor of ancient history at the University of Gratz. The most important of his publications are: *Die Entstehung des herodotischen Geschichtswerkes* (1878); *Themistokles* (1881); *Die griechischen Kriegsalterthümer* (1886); *Litterarische und historische Forschungen zu Aristoteles' Ἀθηναίων Πολιτεία* (1891); *Die Forschungen zur griechischen Geschichte 1883–98* (1899); *Lehrbuch der Allgemeinen Geschichte* (1904); *Lehrbuch der Geschichte des Altertums* (1904); *Die Aufgabe des Gymnasiums* (1908); *Ursprung und Fortwirken der Christliche Weltchronik* (1910).

**BAUER,** ANTON (1772–1843). A German jurist and criminologist, born at Marburg. He was appointed professor at Göttingen in 1813. He is known as the originator of a theory of punishment according to which punishment finds its justification in the warning conveyed by the penalty. His works include: *Grundsatze des peinlichen Rechts* (1806), later published as *Lehrbuch des Strafprozesses* (1835), the first text-book of the science, and *Die Warnungstheorie* (1830).

**BAUER,** BRUNO (1809–82). A rationalistic German critic. He was born at Eisenberg, in the duchy of Saxe-Altenburg, on Sept. 6, 1809. He was the son of a porcelain painter and studied at the University of Berlin, where he became privat-docent in the theological faculty in 1834. He was transferred to the University of Bonn in 1839, but was deprived of his lectureship in 1842 on account of his rationalistic boldness. He then removed to Berlin and for many years devoted himself to the destructive criticism of the Scriptures until, having to his own satisfaction shown that they had no authority, he abandoned such studies and devoted himself chiefly to historical and critical publications. His writings are very numerous. All of them exhibit great learning, industry, research, and acumen, but are completely antagonistic to the received opinions in theology or to any form of evangelical religion. For instance, in his *Christus und die Cäsaren* (Berlin, 1877; 2d ed., 1879), he claims that Christianity was really founded by Seneca! He is generally admitted to be quicker in the discovery of error than of truth. He died at Rixdorf, a suburb of Berlin, April 15, 1882. Consult Lichtenberger, *German Theology in the Nineteenth Century* (Eng. trans.).

**BAUER,** EDGAR (1820–86). A German publicist, brother of Bruno Bauer, born at Charlottenburg. He studied theology and jurisprudence at Berlin and divided his time between travel, literary work, and conflicts with the law. He

served a term of imprisonment for having written *Der Streit der Kritik mit der Kirche und dem Staat*, which was confiscated by the Prussian authorities, but was afterward republished in Bern (1843). His other writings include *Die Rechte des Herzogtums Holstein* (1863); *Die Deutschen und ihre Nachbarn* (1870); *Das deutsche Reich in seiner geschichtlichen Gestalt* (1872); *Das Kapital und die Kapitalmacht* (1884, 1888).

**BAUER,** GEORG. See AGRICOLA.

**BAUER,** HAROLD (1873– ). A celebrated pianist. He was born in London, April 28, 1873, of a German father and an English mother. His father taught him the violin and piano, on both of which instruments the boy made remarkable progress. When he was eight years of age, he was placed under Adolf Pollitzer to be trained as a violin virtuoso. After but two years of further study he made his first successful tour of England as a violinist, in 1883. For the next nine years he continued this career. In 1892 Paderewski heard him play the piano in Paris and predicted a great career for him, if he would devote himself entirely to that instrument. Bauer took the master's advice and became Paderewski's pupil for one year. In 1893 he made his first concert tour as a pianist, through Russia, and then returned to Paris to be heard and at once to become the lion of the hour. His enthusiastic reception from the French induced him to take up his permanent residence in Paris, but his fame quickly spread and soon he was a European celebrity. In 1900 he was heard for the first time in America, where he immediately was received as a prime favorite, so that he subsequently made several more tours of this country, always meeting with undiminished favor. In 1913 his New York recital was one of the most notable of the season. Bauer's wonderful velvety tone—capable of an infinite variety of nuances from the softest pianissimo to the most powerful fortissimo—and a technic exhibiting that limpid clearness which is the ideal of the French school, combined to bring him instant recognition, and the most remarkable thing about this master's exquisite art is the fact that it is to be considered practically the result of self study.

**BAUER,** KAROLINE (1807–77). A German actress. She was born at Heidelberg, made her début at Karlsruhe in 1822, and had achieved a brilliant success there and at Berlin in both comedy and tragedy, when in 1829 she married in London Prince Leopold of Coburg, afterward King of the Belgians. Their morganatic union was brief and unhappy. In 1831 she returned to the stage, which she quitted only upon her marriage to the Polish Count Ladislas de Broel Plater, in 1844. Thereafter she lived in Switzerland, where she died at Zürich. Her *Posthumous Memoirs*, translated into English (1884) with their denunciations of King Leopold and Baron Stockmar, offer a striking contrast to the two pleasing volumes of theatrical reminiscences that had preceded them in 1876 and 1877.

**BAUER,** KLARA (known also by the pen name *Karl Detlef*) (1836–76). A German novelist, born at Swinemünde (Pomerania). She became a teacher of pianoforte at St. Petersburg, where for a time she resided in the house of Bismarck, then Minister to Russia. Her writings, distinguished by pure diction and skill in the delineation of character, include *Unlösliche Bande* (1869; 3d ed., 1877); *Musste es sein?* (2 vols., 1873; 2d ed., 1875); and her best work, *Ein Dokument* (1876; 4 vols., 2d ed., 1878).

**BAUER,** LOUIS A(GRICOLA) (1865– ). An American astronomer and magnetician, born in Cincinnati, Ohio. He graduated at the University of Cincinnati in 1888 and was appointed astronomical and magnetic computer of the United States Coast and Geodetic Survey. In 1895–96 he was instructor in mathematical physics at the University of Chicago, in 1896–97 instructor there in geophysics, and from 1897 to 1899 associate professor of mathematics and mathematical physics at the University of Cincinnati. He also served as chief of the territorial magnetism division of the United States Coast and Geodetic Survey from 1899 to 1906. He became editor of *Terrestrial Magnetism and Atmospheric Electricity* in 1896. In 1904 he was made director of terrestrial magnetism in the Carnegie Institute. His writings include: *Beiträge zur Kenntniss des Wesens der Säcularvariation des Erdmagnetismus* (1895); *Vertical Earth-Air Electric Currents* (1897); *United States Magnetic Tables and Magnetic Charts for 1905* (1908); *Land-Magnetic Observations, 1905–1910* (1913).

**BAUERNFEIND,** bou'ĕrn-fīnt, KARL MAXIMILIAN VON (1818–94). A German engineer, born at Arzberg (Franconia). He studied at Nuremberg and Munich, and in 1846 was appointed professor of geodesy and engineering science in the School of Engineering at Munich. In 1868–74 and 1880–83 he was director of the Technical College of Munich, originally organized according to plans devised by him. He retired in 1890. He was the inventor of the prismatic cross, extensively used in surveying. His original investigations were very extensive. Among his numerous works are *Zur Bruckenbaukunde* (1854; revised ed., 1878), and *Zur Wasserbaukunde* (1886).

**BAUERNFELD,** bou'ĕrn-fĕlt, EDUARD VON (1802–90). An Austrian playwright and poet, born in Vienna. After taking an important part in the exciting political events of 1848, he devoted himself to literature. He was a friend of Grillparzer and of Franz Schubert, for whose opera, *Der Graf von Gleichen*, he wrote the libretto. His works, which were varied, included political fiction, poetry, serious drama, and many very successful comedies. These last are marked by clever dialogue and skillful characterization, and include: *Bekenntnisse* (1834); *Bürgerlich und Romantisch* (1835); *Grossjährig* (1846); *Krisen* (1851); *Aus der Gesellschaft* (1866); *Moderne Jugend* (1868); *Der Landfrieden* (1869). He was less successful in serious drama. His *Gesammelten Schriften* were published in Vienna (12 vols., 1871–72), and *Ausgewählte Werke*, with a biographical and critical introduction by Emil Horner (1905). Consult A. Stern, *Bauernfeld, Ein Dichterporträt* (Leipzig, 1891).

**BAUGÉ,** bō'zhā. The chief town of an arrondissement of the same name in the department of Maine-et-Loire, France, on the Couesnon, 22 miles northeast of Angers (Map: France, N., E 5). It contains a fine old castle of the fifteenth century, formerly the seat of the dukes of Anjou, and is notable as the scene of an English defeat in 1421, when their leader, the Duke of Clarence, was killed. Pop., 1901, 3325; 1906, 3199; 1911, 3235.

**BAUHIN,** bō'ăN', GASPAR or KASPAR (1560–1624). A Swiss botanist and anatomist. He was born in Basel and became professor of anatomy and botany there in 1588. In 1614 he was made professor of medicine. His most important work is the *Pinax Theatri Botanici* (1623). His work on anatomy, entitled *Theatrum Anatomicum* (1621), has considerable historical value.

**BAUHIN,** JEAN (1541–1613). A Swiss botanist, brother of Gaspar Bauhin. He devoted his life to the study of botany and published many excellent works, the most important and best known of which is his *Historia Universalis Plantarum Nova et Absolutissima,* completed by others and published after his death (1650).

**BAUHIN'IA** (after the botanist Bauhin). A genus of plants of the family Leguminosæ. The species, of which there are about 150, are natives of the warmer regions of both hemispheres, and some of them are remarkable for the size and beauty of their flowers. Most of them are twining plants or lianas, stretching from tree to tree in the tropical forests; but some are small trees, as *Bauhinia porrecta,* the mountain ebony of Jamaica, so called from the color of its wood. The inner bark of the Maloo climber, *Bauhinia racemosa,* or *Bauhinia scandens,* and of *Bauhinia parviflora,* East Indian species, is employed for making ropes. *Bauhinia retusa* and *Bauhinia emarginata,* also East Indian, exude a brownish-colored mild gum; while the astringent bark of *Bauhinia variegata* is used in Malabar for tanning and dyeing leather, and also in medicine. The flower buds are often pickled. The leaves of various species are used in Brazil as demulcent medicines, having mucilaginous properties. *Bauhinia splendens,* known as chain creeper, is common in South America. Its stems are very flexible and are of great utility.

**BAUM,** boum, L(YMAN) FRANK (1856–1919). An American author, best known as the creator of "The Wizard of Oz." He was born at Chittenango, N. Y. After having received an academic education at Syracuse, he entered newspaper work in 1880 and was editor of the *Dakota Pioncer* (1880–90) and of *The Show Window* in Chicago (1897–1902). Besides his writings for children, both in the way of books and in contributions to the magazines for 20 years, he is the author of a number of plays, of which *The Wizard of Oz,* a musical extravaganza (1902), had a long run in New York and Chicago. Among his other works may be mentioned: *Mother Goose in Prose* (1897); *Father Goose—His Book* (1899); *The Wonderful Wizard of Oz* (1900); *Baum's Fairy Tales* (1908); *Sky Island* (1912); *The Patchwork Girl of Oz* (1913); and the plays, *The Maid of Arran* (1881) and *The Queen of Killarney* (1885).

**BAUMANN,** bou'mân, ALEXANDER (1814–57). An Austrian playwright and composer, born in Vienna. He first became distinguished through his songs and romances in the dialect of Lower Austria and afterward devoted himself to dramatic composition, his comedies being especially popular. They include: *Beiträge für das deutsche Theater* (1849), *Singspiele aus den österreichischen Bergen* (1850), among which the well-known *Das Versprechen hinterm Herd* has maintained its popularity; *Ehrenbuschn für d'Oesterreicher Armee in Italien* (1854); *Gebirgsbleameln* (8 books); *Aus der Heimat.*



**BAUMANN,** OSKAR (1864–99). A German African traveler, born in Vienna. After study in Vienna and Leipzig, he accompanied Lenz (1885) on the latter's journey up the Congo River to Stanley Falls. In 1886 he explored Fernando Po, in 1888 accompanied an expedition to Kilimanjaro, and in 1890 was sent out by the German East African Society for the exploration of parts of East Africa. During 1892–93 he was the leader of an expedition to Victoria Nyanza, explored the region to the south and west of that lake, and ascertained that the Kagera River, which takes its rise in the Mountains of the Moon, is the lake's chief tributary. He wrote *Afrikanische Skizzen* (1900).

**BAUMBACH,** boum'bäg, RUDOLF (1840–1905). A German poet and novelist. He was born at Kranichfeld, studied natural science at Würzburg and Leipzig, Freiburg and Heidelberg, and afterward lived in Austria till 1885, when he moved to Meiningen. He proved most successful in poetic tales based on popular legends of German and the Slavonic Alps: *Zlatorog* (1875), *Horand und Hilde* (1879), *Frau Holde* (1880), *Der Pate des Todes* (1884), *Kaiser Max und seine Jäger* (1888). He has published seven volumes of lyrics, of which *Lieder eines fahrenden Gesellen* (1878) and *Thüringer Lieder* (1891) are characteristic. His most noteworthy novel is *Trug-Gold* (1878), an historical romance of the seventeenth century. He also wrote the fairy stories, *Sommermärchen* (1881) and *Es war einmal* (1889).

**BAUMÉ,** bō'mā', ANTOINE (1728–1804). A French chemist, known for his discoveries in applied chemistry. He became professor in the college of pharmacy in Paris and founded a large establishment for the preparation of drugs. He published many papers on the application of scientific principles to useful purposes in the arts and manufactures. Among his inventions and improvements were processes for bleaching, purifying saltpetre, manufacturing sal-ammoniac, etc. Baumé's areometer is still in common use in laboratories and in manufacturing establishments. His publications include: *Eléments de pharmacie* (1762) and *Chimie expérimentale et raisonnée* (3 vols., 1773).

**BAUMEISTER,** bou'mī-stĕr, JOHANN WILHELM (1804–46). A German veterinarian, born at Augsburg. In his youth he received extensive training in animal painting and afterward studied and practiced veterinary medicine. In 1839 he was made professor at the School of Veterinary Medicine at Stuttgart. His published works include *Handbuch der landwirtschaftlichen Tierkunde und Tierzucht* (3 vols., 4th ed., 1863), a part of which, under the title *Anleitung zur Kenntnis des Aeussern des Pferdes,* passed through the seventh edition in 1891. Other parts, too, of the *Handbuch* have been published separately and have passed through several editions. The work was beautifully illustrated by the author.

**BÄUMELER,** boi'mə-lĕr, or **BIMELER,** bē'me-lĕr, JOSEPH MICHAEL (1778–1853). The leader of the German "Separatists," who founded the settlement of Zoar, Ohio, in 1817. He was born in Württemberg, Germany, received a good education, and soon identified himself with a group of mystics in his native state, who became known as the Society of Separatists. In 1817 he was chosen leader of the company of about 300 which emigrated to Amer-

ica and settled at Zoar, and until his death he exercised an almost autocratic control over them. Outside the community he was generally known as "King Bimeler," while his fellow Separatists were commonly called "Bimelers." He was at first opposed to the introduction of communism, but finally yielded to the wishes of his associates and was largely responsible for the successful working of the system. For 40 years he was both the spiritual and the temporal leader, and with his death the community began gradually to decline. A number of "discourses" delivered by him in 1832 were published under the title *Die wahre Separation, oder die Wiedergeburt, dargestellt in geistreichen und erbaulichen Versammlungs-Reden und Betrachtungen, besonders für das gegenwartige Zeitalter anwendbar, gehalten in der Gemeinde in Zoar im Jahre 1832* (3 vols., Zoar, 1856), and subsequently formed the basis for a large part of the devotional exercises of the community, exercising an influence among them greater even than that of the Bible. See ZOAR COMMUNITY.

**BAUMGARTEN,** boum'gär-ten, ALEXANDER GOTTLIEB (1714–62). A German philosopher of the school of Wolff. He was born in Berlin and studied at Halle. In 1738 he became privatdocent at Halle, and in 1740 professor of philosophy at Frankfort-on-the-Oder, where he died. His text-books in philosophy were much used, and Kant made them for a while the basis of his own lectures. The cleverness of his style made him an important contributor to modern philosophical terminology. Among other philosophic subjects he contributed an interesting work on æsthetics, but the claim often made that he is the founder of modern æsthetic theory cannot be granted unqualifiedly. His most important works were: *Metaphysica* (1739), reissued by Eberhard (1789); *Ethica Philosophica* (1740); *Æsthetica* (2 vols., 1750–58; left unfinished); *Philosophia Generalis* (ed. by Förster, 1770). Consult G. Meyer, *Leibniz und Baumgarten als Begründer der deutschen Æsthetik* (Halle, 1874), and J. Schmidt, *Leibniz und Baumgarten* (Halle, 1875).

**BAUMGARTEN,** HERMANN (1825–93). A German historian, born at Lesse (Brunswick). In 1842–48 he studied at Jena, Halle, Leipzig, Bonn, and Göttingen, and later at Heidelberg and Munich. In 1861–72 he was professor of history and literature at the Polytechnikum at Karlsruhe and in 1872–89 at the University of Strassburg. His publications include: *Geschichte Spaniens zur Zeit der französischen Revolution* (1861); *Geschichte Spaniens vom Ausbruch der französischen Revolution bis auf unsere Tage* (3 vols., 1865–71); *Karl V und die deutsche Reformation* (1889).

**BAUMGARTEN,** MICHAEL (1812–89). A German theologian, born in Haseldorf (Holstein). He studied at the University of Kiel, in 1846 became pastor at Schleswig, and in 1850 professor of theology at Rostock. Although admittedly orthodox in his views, he strongly opposed the Lutheran hierarchy and was in 1856 removed from the board of theological examiners and in 1858 deprived of his professorship. In 1865 he assisted in founding the Protestantenverein. The more important of his works are his *Die Nachtgeschichte Sacharias* (1858); *Apostelgeschichte* (2 vols., 2d ed., 1859); *Die Geschichte Jesu* (1859); *Schleiermacher als Theolog* (1862); *Zwölf kirchengeschichtliche Vorträge zur Beleuchtung der kirchenlichen Gegenwart* (1869); *Kirchliche Zeitfragen in Vortragen* (1873); *Doktor Martin Luther: ein Volksbuch* (1883). Consult his autobiography, edited by H. H. Studt (Kiel, 1891).

**BAUMGARTEN-CRUSIUS,** boum'gär-ten-krōō'zē-ŭs, LUDWIG FRIEDRICH OTTO (1788–1843). A German theologian. He was born at Merseburg, July 31, 1788, and died at Jena, May 31, 1843. He studied theology at Leipzig and in 1810 became university preacher. In 1812 he was appointed professor extraordinary of theology at Jena, in 1817 full professor of theology, and always distinguished himself as a champion of religious liberty, on behalf of which he wrote various treatises. In 1820 appeared his *Introduction to the Study of Dogmatics* (Leipzig, 1820), a work of considerable originality and wealth of thought. More complete exhibitions of his opinions are to be found in his *Manual of Christian Ethics* (Leipzig, 1826), *Outlines of Biblical Theology* (Jena, 1828), and *Outlines of Protestant Dogmatics* (Jena, 1830). In 1831–32 he published a *Text-Book of the History of Doctrines;* in 1834, a work on *Schleiermacher, his Method of Thought and his Value;* and also *Considerations on Certain Writings of Lamennais.* After his death Kimmel published the whole of his exegetical prelections on the Gospels and Pauline Epistles, and H. Hase completed from his notes his *Compendium der christlichen Dogmengeschichte* (2 vols., Leipzig, 1840–46).

Baumgarten was conspicuous for the breadth and solidity of his learning, the originality of his spirit, and the acuteness of his understanding, but was nevertheless deficient in clear and vivid expression. He attached himself to no school, theological or philosophical. At an early period he had been greatly influenced by the metaphysics of Schelling, from which, however, he ultimately emancipated himself. His thinking was to a certain extent rationalistic, but was strongly modified by the influence of Schleiermacher.

**BAUMGARTNER,** boum'gärt-nĕr, ALEXANDER (1841–1910). A Swiss Jesuit writer, born at Saint-Gall. He entered the Jesuit order in 1860 and completed his theological studies at Münster, Maria-Laach, and Ditton (England). He then studied Scandinavian literature in Copenhagen and Stockholm. In several of his works he seeks to depreciate the German classicists. His writings of this character include *Goethe; sein Leben und seine Werke* (3 vols., 2d ed., 1885–86), *Goethe und Schiller* (1886), and *Der Alte von Weimar* (1886). He has also written a translation from the ancient Icelandic of Eystein Asgrimsson; a festival play on the Spanish poet, *Calderon* (1881); *Longfellow's Dichtungen* (1878); and *Geschichte der Weltlitteratur* (6 vols., 1897–1911).

**BAUMGARTNER,** ANDREAS, BARON VON (1793–1865). An Austrian statesman and scientist. He was born at Friedberg, in Bohemia, and studied at the University of Vienna, where in 1823 he became professor of physics. While filling this office, he gave popular lectures on Sundays upon mechanics for artisans and operatives, which met with much approbation. A result of these lectures was his *Mechanik in ihrer Anwendung auf Künste und Gewerbe* (2d ed., Vienna, 1823) and his *Naturlehre* (Vienna, 1823). Ill health forced him to resign his professorship, and he was appointed director of the Imperial porcelain manufactories, and after-

ward superintendent of the Austrian tobacco manufactories. In the year 1846 the establishment of the electric telegraph was committed to him, and in the following year he was placed in charge of the construction of the Austrian railways. In 1848 he became Minister of Public Works; in May, 1851, he was appointed Minister of Commerce and in December of the same year Minister of Finance. In 1855 he was appointed president of the Austrian Academy of Sciences, of which he had been vice-president for a number of years, and in 1861 he was called to the House of Peers of the Reichsrath. He published, in 1862, *Chemie und Geschichte der Himmelskorper nach der Spektralanalyse;* in 1864, *Die mechanische Theorie der Warme.* Consult Schröter, *Freiherr von Baumgartner, Eine Lebensskizze* (Vienna, 1886).

**BAUMGARTNER,** GALLUS JAKOB (1797–1869). A Swiss statesman and historian, born at Altstätten (canton of Saint-Gall). He studied at Freiburg and Vienna and was prominent in the political affairs of his canton, the revision of whose constitution he promoted. As a member of various representative bodies of the canton and the Confederation, he was a leader of the Liberals until 1841, when he occasioned much surprise by his alliance with the Ultramontane party. In 1857–60 he represented his canton in the Council of Estates. He founded in 1842 the *Neue Schweizer Zeitung,* and published several historical works, of which the most extensive and important is *Die Schweiz in ihren Kämpfen und Umgestaltungen von 1830–50* (4 vols., 1853–66). Consult A. Baumgartner, *Gallus Jakob Baumgartner und die neuere Staatsentwicklung der Schweiz* (Freiburg-im-Breisgau, 1892).

**BAUMSTARK,** boum'stärk, ANTON (1800–76). A German philologist, born at Sinzheim, Baden. He was professor of philology at the University of Freiburg from 1836 to 1871. He published an edition of Curtius Rufus (1829), of Cæsar (1832), and an important work entitled *Urdeutsche Staatsaltertümer* (1873). Some of his writings appeared under the pseudonym of Hermann vom Busche.

**BAUMSTARK,** EDUARD (1807–89). A German political economist, brother of Anton. He was born at Sinzheim, Baden; was educated at the University of Heidelberg; became professor in an academy of agriculture and political science at Eldena in 1842, and in the following year was appointed its director. He was a delegate to the Prussian National Assembly of 1848, and in the following year was elected a member of the Upper House of that body. He was subsequently a Liberal member of the Prussian Upper House and of the North German Diet. His writings deal chiefly with political economy and include the following: *Kameralistische Encyklopädie* (1835); *Grundgesetze der Volkswirtschaft,* a translation of Ricardo's celebrated work (1837; 2d ed., 1877); *Zur Geschichte der arbeitenden Klasse* (1853).

**BAUR,** bour, FERDINAND CHRISTIAN VON (1792–1860). A German theologian. He was born at Schmiden, near Stuttgart, June 21, 1792; studied theology in the Blaubeuren theological seminary from 1805 to 1809 and in the University of Tübingen from 1809 to 1817. In 1817 he became professor in the Seminary of Blaubeuren, where he gave the first indications of his abilities by publishing his *Symbolik und Mythologie oder die Naturreligion des Altertums* (3 vols., Stuttgart, 1824–25), a work which indicates the influence of Schleiermacher over the author. In 1826 he was called to Tübingen, where he held the chair of Protestant theology. His whole life was consecrated to religious studies—the history of doctrines, the symbolism of the Church, and biblical exegesis. On account of the universality of his culture, the wonderful activity and fertility of his mind, his rare combination of speculative thought with solid knowledge, and that faculty of historic divination or insight which enabled him to draw decisive results from separate, obscure, and neglected data, he has been regarded by many in Germany as the most massive theological intellect since Schleiermacher. His method of investigating the progressive history of religious opinion was governed by the principles of Hegelian philosophy, and incurred the reproach of formalism. It was charged that he made dogmas develop themselves with a kind of abstract inevitable regularity from previous historical conditions, without allowing for immediate and extraordinary providences. His most important works in the history of doctrine are *Die christliche Gnosis oder die christliche Religionsphilosophie* (Tübingen, 1835), a work which makes the Christian Gnosis of the second and third centuries the starting point of a long series of religio-philosophical productions traceable uninterruptedly down through Middle-Age mysticism and theosophy to Schelling, Hegel, and Schleiermacher; *Die christliche Lehre von der Versöhnung* (Tübingen, 1838); and *Die christliche Lehr von der Dreieinigkeit und Menschwerdung Gottes* (Tübingen, 1841–43). In reply to Möhler, the celebrated Roman Catholic theologian, who had attacked the Protestant church, he wrote *Der Gegensatz des Katholicismus und Protestantismus* (Tübingen, 1836). Besides these works, based on a historical treatment of religion, to which class also belongs his *Lehrbuch der christlichen Dogmengeschichte* (Stuttgart, 1847), he published various critical treatises on parts of the New Testament; such as *Die Christuspartei in der korinthischen Gemeinde; der Gegensatz des Paulinischen und Petrinischen Christenthums;* and *Der Apostel Petrus in Rom* (1831)—a work in which the author endeavors to demonstrate the existence of deep-rooted differences in primitive Christianity, between a Petrine (Judaizing) and a Pauline (Gentile) party. His inquiries concerning the Gnosis led him to study minutely the pastoral epistles, the result of which study was *Die sogenannten Pastoralbriefe des Apostels Paulus* (Stuttgart, 1835), in which he combats the idea that St. Paul was their author, and refers them to the second century. Of a similar nature is his *Paulus, der Apostel Jesu Christi* (Stuttgart, 1845).

His work on the Gospel of John produced a startling effect, as up to Baur's time that Gospel had generally been held prior in date to the three synoptic Gospels, whereas Baur strove hard to show that it was of post-apostolic origin. In 1847 appeared his *Kritische Untersuchungen über die kanonischen Evangelien, ihr Verhältniss zu einander, ihren Ursprung und Charakter.* In 1851 he published *Das Markusevangelium nach seinem Ursprung und Charakter.* In this and other similar works Baur maintained that we must extend our notions of the time within which the canonical writings were composed to a period considerably post-apos-

tolic, which can only be determined approximately by a careful investigation of the motives which apparently actuated their authors. The chief characteristic, therefore, of the Tübingen school, as exhibited in the works of its founder, is the union of a subjective criticism with a strong conviction of the historic reality of the New Testament writings. He maintained that there were only four genuine Pauline epistles—Romans, 1 and 2 Corinthians, and Galatians. Baur died in Tübingen, Dec. 3, 1860. Of his writings there have appeared in English translation: *Paul, the Apostle of Jesus Christ* (2 vols., 1873–75); *The Church History of the First Three Centurics* (2 vols., London, 1878–79). For his biography, consult: *Worte der Erinnerung* (Tübingen, 1861); C. von Weizsäcker, *Ferdinand Christian Baur. Rede zur akademischen Feier seines 100. Geburtstages* (Stuttgart, 1892); also, in general, R. W. Mackay, *The Tübingen School and its Antecedents* (London, 1863); A. B. Bruce, *F. C. Baur and his Theory of the Origin of Christianity* (New York, 1886); Fraedrich, *Ferdinand Christian Baur* (Gotha, 1902).

**BAUR,** GUSTAV ADOLF LUDWIG (1816–89). A German evangelical theologian, born at Hammelbach (Odenwald). He studied at the University of Giessen, was appointed professor there in 1847, and in 1870 became professor at Leipzig. His publications include: *Grundzüge der Homiletik* (1848); *Boëtius und Dante* (1874); *Die vorchristliche Erziehung* (1884; vol. i, K. A. Schmid's *Geschichte der Erziehung*).

**BAURE,** bou'rā. A tribe of Arawakan stock living on the eastern slope of the Cordilleras, on the Rio de los Baures, a tributary of the Beni River, in the department of La Paz, Bolivia. About the year 1674 they were Christianized by Jesuit missionaries and gathered into mission villages, together with the Moxos (q.v.).

**BAUSE,** bou'ze, JOHANN FRIEDRICH (1738–1814). A German engraver. He was born at Halle. He studied with J. J. Haid at Augsburg, and came under the influence of J. G. Wille, whom he took as his model. He became a member of the Leipzig Academy of Art in 1766 and spent the rest of his life in that city except the last year, when he was at Weimar in friendly relations with Goethe. His principal strength lay in portrait engraving, of which he was regarded as the leading exponent in Germany, although his technique is now regarded as somewhat mechanical. He made more than 200 portraits of contemporary notables, including reigning princes, theologians, merchants, scholars, poets, and actors. Among the prominent names in this valuable collection are the following: Joseph II (1762); Peter I and Peter III, Czars of Russia (1786 and 1762, respectively); Catharine II of Russia (1762); Frederick II, King of Prussia (1759); and the authors Gellert, Lessing, Mendelssohn, Leibnitz, Kant, Winckelmann, and Hagedorn. A catalogue raisonné of his works was published by Keil (Leipzig, 1849).

**BAUSMAN,** bous'man, BENJAMIN (1824–1909). An American Reformed (German) clergyman, born at Lancaster, Pa. He graduated at Marshall College (1851) and at the Theological Seminary, Mercersburg, Pa. (1852). He became pastor at Reading, Pa., in 1863. His books include: *Sinai and Zion*, travels (1860); *Wayside Gleanings in Europe* (1878); *Bible Characters* (1893); edition of *Harbaugh's Harfe, a Volume of Poems in the Pennsylvania German Dialect* (1870).

**BAUTAIN,** bō'tăN', LOUIS EUGÈNE MARIE (1796–1867). A French theologian and philosophic writer. He was born in Paris and studied at the Ecole Normale Supérieure. At the age of 20 he was made professor at the College of Strassburg, and later held a professorship at the university of that city, but was suspended from office in 1822 on charges of heterodoxy. In 1848, however, he was made vicar-general of the Diocese of Paris, and five years later professor of theology at the Sorbonne. His best-known writings include: *Art of Extempore Speaking* (1858–78); *De l'enseignement de la philosophie en France au XIX^e siècle* (1833); *Philosophie du christianisme*, edited by Bonnechose (1835); *Psychologie expérimentale* (1839; a second edition under the title *L'esprit humain et ses facultés*, 1859); *Philosophie morale* (1842); *La liberté et la religion* (1848); *La morale de l'évangile comparée aux divers systèmes de morale* (1855); *La philosophie des lois au point de vue chrétien* (1860). Bautain held that divine revelation is the only possible criterion of truth on ethical subjects.

**BAUTZEN,** bout'sen, or **BAUDISSIN,** bou'dē-sēn (Wendish *Budyśin*, hut city, from Slav. *buda*, hut, tent, Eng. *booth*). The capital of the circle of the same name in the Kingdom of Saxony, situated on rising ground overlooking the river Spree, 35 miles by rail east-northeast of Dresden (Map: German Empire, F 3). Ancient walls and defenses are preserved and have been transformed into promenades. Among the religious edifices the most noteworthy is the cathedral of St. Peter, which is divided into two parts by a grating and is used by both Protestants and Roman Catholics. The castle of Ortenburg, often the residence of the kings of Bohemia, is now occupied by government offices. The city's affairs are administered by a municipal council of 24 members and an executive board of 7. (See GERMANY, *Local Government.*) There are numerous schools, three public libraries, several museums, and an art gallery. Manufacturing industries are flourishing and include the production of woolen and other textiles, leather, paper, beer, pottery, etc. There are also dye works, distilleries, and iron foundries, and an active trade. Bautzen is a place of considerable antiquity and was made a town under Otho I in the tenth century. It suffered greatly in the war with the Hussites and still more during the Thirty Years' War. It is celebrated as the place where Napoleon, with an army of 130,000 men, after an obstinate resistance, won a barren victory over 90,000 of the allied Russians and Prussians on May 20–21, 1813. The Allies lost in the two days 12,000 killed and wounded, in addition to 1500 taken prisoners. The French left 5000 dead upon the field and had over 15,000 wounded. Pop., 1900, 26,000; 1905, 29,371; 1910, 32,760.

**BAUXITE,** bōks'īt (from *Baux;* see below). The most important ore of aluminum, a hydrate with a variable composition which may be represented by the formula $Al_2O_3.xH_2O$. It carries from 20 to 40 per cent aluminum and usually some iron and silica. The ore occurs in rounded grains, in pisolitic or clay-like masses. The grains usually show a concentric structure and a variable color from white to yellow, brown, or red. It is named from its occurrence at

Baux, in France, but it is also known from Styria and Carinthia, in Austria, and from Antrim, in Ireland. In the United States it occurs in a belt about 60 miles long, extending from northwestern Georgia into northeastern Alabama, and also in Arkansas, near Little Rock. The foreign deposits result from the chemical alteration of the aluminous silicates in igneous rocks; the American deposits are in part of the same origin and partly hot-spring formations. Those of Alabama and Georgia are basin shaped and are limited vertically to points between 900 and 950 feet above sea level. The composition of good-grade American ore is approximately as follows: Alumina, 57 to 62 per cent; ferric oxide, under 1 per cent; silica, 2.5 to 3 per cent; titanic acid, 3 to 4 per cent; water (combined), 20 to 30 per cent; moisture, retained mechanically, 2 to 4 per cent. While bauxite serves chiefly as an ore of aluminum, it is also employed in the manufacture of alum, in making alundum, and for lining basic converters and Siemens-Martin furnaces in the manufacture of steel. The principal production of bauxite is in Arkansas. The total output in the United States in 1911 was 155,618 long tons valued at $750,649. Consult: Hayes, "Bauxite," *Sixteenth Annual Report United States Geological Survey*, part iii (Washington, 1895); *Mineral Industry*, vol. ii (New York, 1893); Branner, "The Bauxite Deposits of Arkansas," *Journal of Geology*, vol. v (Chicago, 1897). See also ALUM; ALUMINIUM.

**BAVA'RIA** (Ger. *Bayern*). A kingdom and one of the constituent states of the German Empire, the largest in area and population next to Prussia. The Grand Duchy of Hesse divides Bavaria into two unequal parts. The eastern part is bounded by Austria on the east and south, Saxony, the Thuringian States, and Hesse-Nassau, on the north, and Württemberg, Baden, and Hesse on the west. The western portion, or Rhine Palatinate, is situated between Baden, Prussia, Alsace-Lorraine, and Hesse, and occupies only one-thirteenth part of the entire kingdom. The following table gives the area of Bavaria and its population in 1900 and at the census of Dec. 21, 1910:

| Govt. districts | Sq. miles | Pop., 1900 | Pop., 1910 |
|---|---|---|---|
| Upper Bavaria | 6,454 | 1,323,888 | 1,532,065 |
| Lower Bavaria | 4,148 | 678,192 | 724,331 |
| Upper Palatinate | 3,729 | 553,841 | 599,461 |
| Upper Franconia | 2,702 | 608,116 | 661,862 |
| Middle Franconia | 2,930 | 815,895 | 931,691 |
| Lower Franconia | 3,244 | 650,766 | 710,943 |
| Swabia | 3,797 | 713,681 | 789,853 |
| Palatinate | 2,289 | 831,678 | 937,085 |
| Total | 29,293 | 6,176,057 | 6,887,291 |

In 1816 the population was 3,607,000; in 1864, 4,775,000; in 1871, 4,863,450; in 1880, 5,284,778; in 1890, 5,594,982. The average annual increase from 1816 to 1864 was 0.58 per cent; from 1864 to 1910, 0.80 per cent; from 1900 to 1910, 1.09 per cent. At the 1911 census there were 3,379,580 males and 3,507,711 females, or 1038 females to each 1000 males. Of the total, Roman Catholics numbered 4,863,251 (70.61 per cent); evangelical Christians, 1,942,658 (28.21 per cent); other Christians, 13,963 (0.20 per cent); Jews, 55,065 (0.80 per cent). The larger cities are: Munich, the capital, with 596,467 inhabitants at the 1910 census; Nuremberg, 333,142; Augsburg, 102,487 (not including Pfersee, with 10,928 inhabitants, annexed Jan. 1, 1911); Würzburg, 84,496; Ludswigshafen-am-Rhein, 83,801; Fürth, 66,553; Kaiserslautern, 54,659; Regensburg (Ratisbon), 52,624; Bamberg, 48,063; Hof, 41,126; Pirmasens, 38,463; Bayreuth, 34,547.

Bavaria may be described as a true geographical unit, as almost all of its boundary lines are formed by mountain ranges which lie in a rectangle around its inner basin. On the south it takes in a part of the eastern Alps, which form the three mountain ranges of southern Bavaria; the Algäuer Alps; the Bavarian Alps, containing the highest summit of the German Empire, the Zugspitze (9725 feet); and the Salzburger Alps. Along the Bohemian frontier stretches the mountain range of Böhmerwald, with its offshoot, the Bayerischer Wald, running in a northwestern direction along the Danube. On the north rise the Fichtelgebirge, the Rhöngebirge, and in the northwest is the Spessart. The Franconian Jura traverses the west and centre. The interior of Bavaria is an elevated plateau, sloping toward the north, with a mean altitude of 1600 feet, and intersected in several directions by low hills. The largest mountain range in the Palatinate is the Hardt Mountains, which have an elevation of over 2200 feet.

Bavaria belongs mainly to the basin of the Danube, by which it is traversed through its entire width from west to east. The part of Bavaria south of the Danube is drained by the tributaries of that stream, the most important of which are the Iller, Lech, Isar, and Inn. The northern tributaries of the Danube in Bavaria are the Wörnitz, Altmühl, Naab, Regen, and Vils. The northwestern part of Bavaria is drained by the Main and its tributary the Regnitz. There are not a few lakes in the southern part of the kingdom, the most important of which are the Chiemsee, Starnbergersee, and Ammersee, besides several mountain lakes, the most famous of which is Königsee, noted for its beautiful scenery. The most important canal of Bavaria is the Ludwigskanal, which connects the Altmühl, a tributary of the Danube with the Main, a tributary of the Rhine, thereby serving as a connecting link between the North and the Black seas. Among the numerous mineral springs in Bavaria the most famous are those of Kissingen and Reichenhall.

**Climate.** The climate of Bavaria, although somewhat colder than that of the rest of Germany, is on the whole mild and salubrious. The average annual temperature ranges from about 49° F. in the valleys along the Danube, the Rhine, and the Main, to less than 44° F. in the mountainous regions, with very considerable fluctuations. The rainfall ranges from about 23.5 inches around the Hardt Mountains, in the centre of the Rhine Palatinate, to over 78 inches in the southern part of Bavaria proper.

**Mineral Resources.** The mineral deposits of Bavaria are of considerable variety, but not much mining is being done outside of coal and iron. The coal output in 1910 was 773,916 metric tons, valued at 9,556,000 marks; brown coal, 1,494,631 tons, 11,160,000 marks; iron ore, 305,335 tons, 2,596,000 marks; graphite, 7415 tons, 314,000 marks; rock salt, 1192 tons; common salt (from aqueous solution), 45,141 tons, 2,053,000 marks; other salt, 41,524 tons, 2,704,000 marks.

**Agriculture.** Agricultural production is of relatively greater importance in Bavaria than

in any other German state, and the soil has been brought to a degree of cultivation surpassed in only few countries. Threatened by the competition of new countries with a virgin soil and cheap land, the Bavarian landholder was compelled to adopt every available means in order to increase the productiveness of the soil. With this end in view numerous associations were formed in almost every department of agriculture. The buying of seeds and agricultural machinery, storing of grain, raising of domestic animals, marketing of agricultural products, insurance of farm buildings and crops, and numerous other operations are all carried on largely through coöperative societies. A considerable proportion of the landholders are in the habit of insuring their crops. In his struggle against foreign competition the Bavarian landholder has not been left entirely to his own efforts. The state has come to his assistance in offering him reduced rates on the transportation of agricultural products, machinery, and manure, in establishing agricultural banks, in improving the breed of domestic animals, and in opening agricultural schools. That all of these measures have helped to bring about a decided improvement in agricultural methods is shown by the enormous increase in the use of agricultural machinery in the last decades.

Of the total area in 1900, 3,047,300 hectares (or 40.2 per cent) were in cultivated field and garden; 1,296,700 hectares (17.1 per cent), meadow; 260,700 hectares (3.4 per cent), pasture; 24,900 hectares (0.3 per cent), vineyard; 2,466,600 hectares (32.5 per cent), forest; 490,900 hectares (6.5 per cent), roads, yards, water, etc. The areas devoted to leading crops in 1912 in hectares and the production in metric tons in 1912 and 1911 were as follows:

| | Ha. 1912 | Tons 1912 | Tons 1911 |
|---|---|---|---|
| Rye | 567,189 | 929,644 | 764,852 |
| Wheat | 290,375 | 489,785 | 431,397 |
| Winter spelt | 61,653 | 89,503 | 89,594 |
| Summer barley | 361,376 | 668,780 | 671,269 |
| Oats | 506,955 | 744,661 | 741,151 |
| Potatoes | 370,806 | 4,708,746 | 2,510,811 |
| Hay | 1,283,615 | 6,338,750 | 4,628,076 |
| Hops | 17,625 | 11,509 | 4,800 |

Other crops of importance are sugar beets, tobacco, and rape seed. Vine growing is an important industry, but shows no progress; it is confined almost entirely to the Palatinate and Lower Franconia. The following figures relate to 1911 and 1912 respectively: Productive area under vines, 20,570 and 20,650 hectares (12,202 and 15,328 in the Palatinate); yield of must, 713,511 and 575,301 hectoliters; value of must, 40,600,000 and 25,900,000 marks.

In 1882 there were 681,521 farms, and in 1907 669,911. The following figures are for 1895 and 1907 respectively: farms under two hectares, 236,575 (4.1 per cent of total farm area) and 241,642 (4.0 per cent); between two and five hectares, 165,408 (12.7) and 162,431 (12.9); between five and 20, 216,999 (49.5) and 224,640 (52.1); between 20 and 100, 44,182 (31.1) and 40,663 (28.8); 100 hectares and over, 621 (2.6) and 535 (2.2); total farms, 663,785 in 1895, comprising 4,341,577 hectares, and 669,911 in 1907, comprising 4,239,237 hectares.

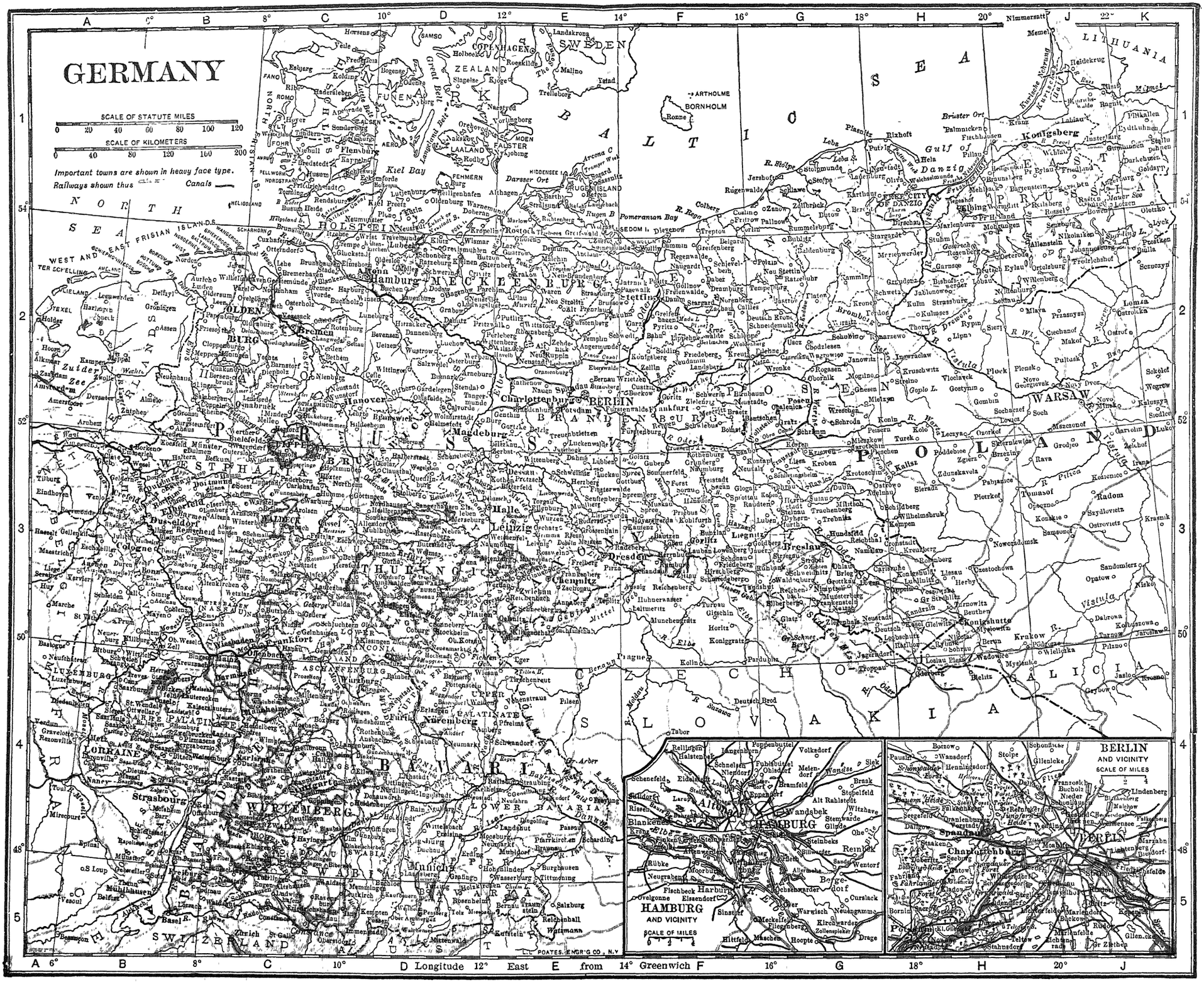
In number of live stock Prussia stands first and Bavaria second among the German states. Stock breeding is conducted with great care and intelligence, and state studs are maintained for improvement of the breed of horses. Live stock, December, 1912: horses, 400,300; mules and asses, 700; cattle, 3,554,000; sheep, 474,000; swine, 1,812,000; goats, 310,861; fowls, 10,319,000.

The woods and forests of Bavaria in 1900 covered an area of 2,466,600 hectares, or 32.5 per cent of the total area of the kingdom, of which 49 per cent belongs to private persons, 34 per cent to the state, and the remainder mostly to the communities. The annual income derived from the forests through the sale of timber and the rent of grazing land amounts to about $10,000,000.

**Manufactures.** Bavaria is the largest per-capita beer-producing country in the world, and its beer has a world-wide fame. In 1911 its per-capita production was 283 liters, as compared with 178 for Württemberg, 149 for Baden, 79 for Alsace-Lorraine, and about 107 for all Germany. Bavaria's total beer production is almost two-sevenths that of the Empire; in 1911 it was 19,642,000 hectoliters (as compared with about 70,353,000 hectoliters in the Empire); in 1910, 18,110,000; in 1907, 18,641,000. The textile and metal industries are developed to a considerable extent. There are also some large tobacco factories, tanneries, and chemical works. Among other important industries is the manufacture of earthenware, glass, agricultural implements, machinery, leather goods, and wooden articles. There are many establishments devoted to the polygraphic processes.

**Commerce and Transportation.** Bavaria's foreign commerce is included in that of the German Customs Union. Its chief export is beer. In 1911 Bavarian railways aggregated 8216.4 kilometers (5105.4 miles), of which 8060.6 kilometers broad gauge and 155.8 narrow gauge. Of broad-gauge railway there were 106.2 kilometers per thousand square kilometers of territory and 116.4 kilometers per 100,000 inhabitants. Of broad-gauge railway 7818.7 kilometers were state lines, and 241.9 kilometers private. Of the narrow gauge 115.5 kilometers were state, and 40.3 private. The navigation on the Danube, the Main, and the Lake of Constance is very active.

**Government.** Bavaria is a constitutional monarchy, the crown being hereditary by primogeniture in the male line or, if that fails, in the female line. The constitution of Bavaria bears date of May 26, 1818. It has been modified since. The kingdom, which entered the North German Confederation by treaty of Nov. 23, 1870, for the establishment of the German Empire, is independent in its internal affairs, having complete control of its army in time of peace, managing its own transportation and communication facilities, and collecting revenue for its separate budget. The executive power is vested in the King, who is assisted by a responsible ministry of seven members, and advised by a state council. The legislative power rests with the King and the Parliament (*Landtag*), which consists of two houses. The Upper House, or Chamber of Councilors of the Realm, consisted in 1913 of 18 princes of the royal family, 2 crown dignitaries, 2 archbishops, the heads of 17 noble families of the realm, 1 bishop, the president of the Protestant Chief Consistory, 32 hereditary members, and 18 persons appointed for life by the King; total, 91. The number of life members must not exceed one-third of the hereditary councilors. The president of the Upper House is


GERMANY
SCALE OF STATUTE MILES
0 20 40 60 80 100 120
SCALE OF KILOMETERS
0 40 80 120 160 200
Important towns are shown in heavy face type.
Railways shown thus
Canals
NORTH SEA
BALTIC SEA
SWEDEN
DENMARK
COPENHAGEN
HOLSTEIN
MECKLENBURG
PRUSSIA
EAST PRUSSIA
WEST PRUSSIA
POSEN
POLAND
WARSAW
LITHUANIA
Konigsberg
Danzig
Gulf of Danzig
FREE CITY OF DANZIG
Stettin
Hamburg
Altona
Bremen
Hanover
Berlin
Charlottenburg
Potsdam
Magdeburg
Brunswick
OLDENBURG
HANOVER
WESTPHALIA
RHINE PROVINCE
Cologne
Dusseldorf
Elberfeld
Aachen
Frankfort
Wiesbaden
Mainz
Darmstadt
Mannheim
Heidelberg
Karlsruhe
Strasburg
Metz
Nancy
LORRAINE
ALSACE
LUXEMBURG
HESSE-NASSAU
HESSE-DARMSTADT
HESSE-CASSEL
WALDECK
THURINGIA
Leipzig
Dresden
Chemnitz
Halle
Erfurt
Weimar
Gotha
Coburg
Meiningen
Fulda
SAXONY
Breslau
Liegnitz
Glogau
Posen
Bromberg
Thorn
Graudenz
Marienburg
Elbing
Konigsberg
Memel
Tilsit
Insterburg
Gumbinnen
Allenstein
Johannisburg
Lyck
Soldau
Neidenburg
Lobau
Rastenburg
Goldap
Pillau
Braunsberg
Heiligenbeil
Mohrungen
Deutsch Eylau
Rosenberg
Marienwerder
Neumark
Schwetz
Strasburg
Briesen
Culm
Graudenz
Kulmsee
Lobau
Rypin
Lipno
Sierpc
Plock
Pultusk
Ostrolenka
Makow
Ostrow
Ciechanow
Przasnysz
Mlawa
Soldau
Neidenburg
Lyck
Johannisburg
Sensburg
Nikolaiken
Sprindt L.
Spirding L.
Loetzen
Oletzko
Angerburg
Darkehmen
Stallupohnen
Ragnit
Pillkallen
Eydtkuhnen
Labiau
Wehlau
Insterburg
Gumbinnen
Goldap
Darkehmen
Stallupohnen
Ragnit
Memel
Heidekrug
Kurische Nehrung
Kurisches Haff
Frische Nehrung
Frisches Haff
Brister Ort
Pillau
Fischhausen
Palmnicken
Kranz
Cranz
Rossitten
Nidden
Schwarzort
Memel
Libau
Windau
Mitau
Riga
Dorpat
Pernau
Reval
Narva
Gulf of Finland
Petersburg
Moscow
Smolensk
Minsk
Pinsk
Brest-Litovsk
Grodno
Bialystok
Suwalki
Augustowo
Lomza
Ostrolenka
Ostrow
Makow
Ciechanow
Przasnysz
Mlawa
Soldau
Neidenburg
Lyck
Johannisburg
Sensburg
Nikolaiken
Sprindt L.
Spirding L.
Loetzen
Oletzko
Angerburg
Darkehmen
Stallupohnen
Ragnit
Pillkallen
Eydtkuhnen
Labiau
Wehlau
Insterburg
Gumbinnen
Goldap
Pillau
Braunsberg
Heiligenbeil
Mohrungen
Deutsch Eylau
Rosenberg
Marienwerder
Neumark
Schwetz
Strasburg
Briesen
Culm
Graudenz
Kulmsee
Lobau
Rypin
Lipno
Sierpc
Plock
Pultusk
Ostrolenka
Makow
Ostr

appointed by the King. The members of the Lower House, 163 in number, are elected for six years by direct vote. The voting franchise is restricted by a property qualification. The Chamber of Deputies elects its own president and vice president, and its sanction is necessary for almost every measure relating to the financial affairs of the realm. It enjoys the right of initiative to a considerable extent. In the Imperial *Bundesrat* Bavaria is represented by six members, and in the *Reichstag* by 48.

For purposes of local administration Bavaria is divided into eight government districts (*Regierungsbezirke*), subdivided into administrative districts. In every government district there is a *Landrat*, consisting of representatives of the districts, the towns, the landed nobility, the clergy, and the university, if there be one, all elected for six years.

The budget of Bavaria is fixed every two years. The budget for each of the years 1911 and 1912 balanced at 676,214,154 marks; for 1913, 691,930,633 marks; the latter figure shows that the budget doubled in 15 years. The revenue is derived mainly from public works, Imperial repayments, and indirect taxes. The public debt at the end of 1911 amounted to 2,427,281,578 marks, of which 1,913,315,200 marks, or about 79 per cent, was on account of the railways.

Education is free and compulsory, and provided for by the state in a generous manner. There are three universities (at Munich, Würzburg, and Erlangen) and a large number of secondary and special schools. In 1911 the public elementary schools numbered 7566, with 18,352 teachers (of whom 13,521 were male) and 1,041,676 pupils. There were 43 gymnasia, with 1146 teachers and 17,652 students. In the winter semester of 1912–13 the University of Munich had 7718 students; Würzburg, 1548; Erlangen, 1307.

**History.** The Celtic inhabitants of what now constitutes the southern part of Bavaria were conquered by the Romans about 15 B.C. The region was included partly in Vindelicia and partly in Noricum. The Romans founded the colonies of Augusta Vindelicorum, "Augusta of the Vindelici" (now Augsburg), Regina Castra (Regensburg or Ratisbon), and Castra Batava (Passau). At the time of the great migration of nations the Marcomanni, moving westward from their seats in Bohemia (Boiohæmum, so named from the Celtic Boii, whom the Marcomanni had conquered about the beginning of the Christian Era), settled in Bavaria, which took its name from the new occupants, who were known as Boiarii (possessors of the country of the Boii). Dukes of the Bavarians appear in history as early as the sixth century. The bishoprics of Salzburg, Passau, Freising, and Ratisbon were founded or restored in the eighth century. Before the close of that century Bavaria had been brought completely under the sway of the Franks. After the extinction of the Carlovingian dynasty, early in the tenth century, a new Duchy of Bavaria arose. In 1070 Bavaria passed into the possession of the Guelph (Welf) family. In 1180, when Henry the Lion was placed under the ban of the Empire by Frederick Barbarossa, his Bavarian territories were transferred to Otho, Count of Wittelsbach, whose descendant now occupies the royal throne. The Rhenish Palatinate was conferred on this family by the Emperor Frederick III in 1214. Louis of Bavaria was Emperor of Germany in 1314–47. At this time the Palatine was separated from Bavaria. (See PALATINATE.) Duke Maximilian, for his services to the Imperial cause in the Thirty Years' War (q.v.), was raised to the dignity of Imperial Elector in 1623, and in 1628 was invested with the Upper Palatinate. In the War of the Spanish Succession Bavaria supported France. The Elector Charles Albert was one of the princes who sought to dismember the Austrian dominions on the accession of Maria Theresa. (See AUSTRIAN SUCCESSION, WAR OF THE.) He was elected Emperor of Germany in 1742, and died in 1745. In 1777 the Wittelsbach line in the Electorate of Bavaria became extinct, and the Wittelsbach line in the Rhine Palatinate succeeded to the throne. In 1805 Bavaria was erected into a kingdom by Napoleon I. The King assisted Napoleon in his wars and received large additions of territory. In 1813, however, he cleverly contrived to change sides and thus managed to have confirmed to him, by the treaties of 1814–15, an extent of territory nearly as valuable as the possessions which the treaties of Pressburg and Vienna had given him and which he had now to restore to Austria.

In 1818 the new constitution came into existence, but, owing to various causes, it did not secure the measure of popular freedom that had been expected. In 1825 Louis I ascended the throne. He was a well-meaning and liberal monarch, but he lavished the wealth of the kingdom on the embellishment of the capital and on works of art, while he neglected works of practical value. The revolutionary wave of 1830 produced some disquiet in the country, but no serious disturbance. The Bavarian government, however, took alarm, and restricted the freedom of the press; and, though the restrictions were speedily repealed, dissatisfaction was created by the imposition of new taxes. The Jesuits obtained great influence with the King, which they used to the detriment of popular rights. The people were further aroused by the King's relations with the notorious Lola Montez (q.v.), who was looked upon as an agent of the Ultramontanes. In March, 1848, following the example of the French revolutionists, the people of Munich seized the arsenal and demanded reform and the expulsion of Lola Montez. The King had to consent, but in the same month he abdicated. His son, Maximilian II, ascended the throne. He died in 1864, and was succeeded by Louis II, a distinguished patron of Wagner, the great musician. After 1850 Bavaria showed itself hostile to the national movement toward German unity under the leadership of Prussia. In the War of 1866 it sided with Austria against the former power, suffered defeat, and was compelled to cede nearly 300 square miles to Prussia and to enter into an offensive and defensive alliance with the victor. The country was forced by the power of national sentiment to join in the war against France. Circumstances thereafter made its entrance into the new German Empire inevitable. In June, 1886, Louis II, who had become insane, committed suicide. His brother assumed the title of Otho I; but this prince being also mentally incapable of governing, the regency was taken over by an uncle, Prince Luitpold, who ruled in behalf of the demented monarch till Dec. 12, 1912, when he was succeeded in the regency by his son Prince Ludwig Leopold. On Nov. 9, 1913, the regent, consenting to widespread popular demand, accepted the crown as Louis III (1845–1921).

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**BA'VIUS** and **MÆ'VIUS.** Two Latin poetasters, who, otherwise unheard of, were made immortal bywords through their malevolence toward Horace and Vergil. Nothing further definite is authentically known of them, although they have unwarrantedly been credited with the *Antibucolica*, two pastoral parodies of the Vergilian *Eclogues*. By Vergil they are contemptuously dismissed with the well-known verse:

> "Qui Bavium non odit, amet tua carmina, Mævi"
> (*Ecl.* III, 90.)

Horace, however, in the Tenth Epode attacks Mævius in a tone of boisterous and half-burlesque exaggeration.

**BAWBEE'**, or **BABEE.** The popular designation of a half-penny in Scotland, now dropping out of use. The origin of the term is obscure, but it is most probably a corruption of the French *bas billon* ("base bullion" or mixed metal), applicable to debased copper money. In the plural form the word is popularly used in Scotland to signify money generally.

**BAX,** ERNEST BELFORT (1854–1926). An English writer on Socialism, born at Leamington, England. Educated privately in London and in Germany, he made a special study of music, and later of philosophy, especially the German movement from Kant to Hegel. In 1880–81 he was engaged as a correspondent of English papers, but presently he decided to leave the Continent. Upon his return to England he became prominently identified with the early Socialist movement. In conjunction with William Morris (q.v.) he helped in 1885 to found the Socialist League, and for a time was editor, with Morris, of the weekly journal, *Commonweal*. Subsequently resigning from the league, he interested himself in the Social Democratic Federation, of whose organ, *Justice*, he was made editor. He attended various international congresses as a delegate from the federation. Among his journalistic activities is to be included the editing, for a period, of the Socialist monthlies, *Time* and *To-Day*. He wrote the following books on historical and economic subjects: *Jean-Paul Marat* (1878); *Handbook to the History of Philosophy* (1884); *Religion of Socialism* (1886); *French Revolution* (1890); *The Problem of Reality* (1893); *Socialism; Its Growth and Outcome, with William Morris* (1894); *Essays in Socialism, New and Old* (1906); *The Roots of Reality* (1907); *The Last Episode of the French Revolution* (1911); *Problems of Men, Mind, and Morals* (1912).

**BAX'TER,** JAMES PHINNEY (1831–1921). An American historian, born at Gorham, Me. He had an academic education and became a prominent merchant and manufacturer in Portland, Me., of which city he was six times elected mayor. He organized the Associated Charities and was its first president. He was chosen president of the Maine Historical Society, edited ten volumes of the *Documentary History of Maine*, and published: *The Trelawney Papers* (1884); *George Cleeve and His Times* (1885); *The British Invasion from the North* (1887); *Sir Ferdinando Gorges and his Province of Maine* (1890); *The Pioneers of New France in New England* (1894); *The Voyages of Jacques Cartier* (1906); and co-author of a *World Atlas of Christian Missions* (1911).

**BAXTER,** RICHARD (1615–91). An English Nonconformist divine, born Nov. 12, 1615, at Rowton, near Shrewsbury, Shropshire. He was privately and none too well educated and in 1633 went to court with an introduction to the master of the revels. A month convinced him that he was out of his element at Whitehall, and an illness after his return deepened the earnestness of his religious convictions. He studied theology, was ordained (1638), became master of the Dudley grammar school, and then assistant to a clergyman at Bridgnorth, and in 1640 was chosen parish clergyman of Kidderminster. There he established a reputation as one of the most remarkable preachers of his time and effected a wonderful improvement in the manners of the people. On the breaking out of the Civil War his position was peculiar. His religious sympathies were almost wholly with the Puritans, his political with the monarchy, and, though a Presbyterian in principle, he was far from admitting the unlawfulness of episcopacy. The open respect he showed to some leading Puritans exposed him to danger from the mob. He retired to Coventry, where he ministered for two years to the garrison and inhabitants. He afterward accepted the office of chaplain to Colonel Whalley's regiment and was even present at the sieges of Bridgewater, Exeter, Bristol, and Worcester. He was in the army hoping to modify the intolerance of partisanship, and to promote "the spirit of love and of a sound mind." When ill health forced him to leave the army, he returned to Kidderminster and continued to labor there for some time. At this time he wrote *Saints' Rest* and *Call to the Unconverted*. He never dissembled his sentiments with regard to the execution of the King and the usurpation of Cromwell, even in the presence of the Protector. On the return of Charles, Baxter was appointed one of his chaplains (1660) and took a leading part in the conference held at the Savoy to reconcile the contending church factions, a project defeated by the bigoted obstinacy of the bishops. The see of Hereford was offered to him but he declined and asked to be permitted to return to Kidderminster. His request was refused. The Act of Uniformity at length drove him out of the Anglican church, and in July, 1662, he retired to Acton, in Middlesex, where he spent the greater part of nine years, chiefly occupied in writing. The Act of Indulgence in 1672 permitted him to return to London. In 1685 Judge Jeffreys condemned him, for "sedition" in his *Paraphrase of the New Testament*, published in that year, to pay a fine of 500 marks, and in default, to the King's Bench Prison. The trial is described by Macaulay in his history. After 18 months Bax-

ter was released and the fine remitted. After this he preached frequently without molestation. He died in London on Dec. 8, 1691.

Baxter is said to have preached more sermons, engaged in more controversies, and written more books than any other Nonconformist of his age; and Dr. Isaac Barrow said that "his practical writings were never mended, and his controversial seldom confuted." The total number of his publications exceeded 160. By far the most popular are his *Saints' Everlasting Rest* (London, 1650), only read now in an abridgment of an abridgment; *Dying Thoughts* (1683), and *Call to the Unconverted* (1657)—20,000 copies of which were sold in a twelvemonth, and which was translated into all European languages. His important theological writings are *Methodus Theologiæ Christianæ* (1681) and *Catholic Theology* (1675), in which his peculiar system (see BAXTERIANS)—a compromise between Arminius and Calvin—is embodied. He had long controversies with John Owen (q.v.), a rigid Calvinist, and with William Penn—for all his breadth of vision he had no sympathy with the Quakers. Some of his devotional poems are still used in some hymnals. His autobiographical narrative is historically valuable; the review of his religious opinions Coleridge called one of the most remarkable pieces of writing in religious literature. His *Practical Works*, in 23 volumes, with a biography by Orme, were published (London, 1830), and reprinted in 2 volumes, with life, by L. Bacon (New Haven, 1844); also in 4 volumes, with an introductory essay by Rogers (London, 1868). Consult: biographies by Orme (London, 1830), J. Stalker (1882), Boyle (1883), J. H. Davies (1887); the autobiography, *Reliquiæ Baxterianæ*, edited by Sylvester (1696), and by Jayne (London, 1910); an essay by Sir James Stephen in the second volume of his collected *Essays* (new ed., New York, 1907); Currier, *Nine Great Preachers* (Boston, 1913).

**BAXTER,** ROBERT DUDLEY (1827–75). An English political economist, born at Doncaster, Yorkshire, and educated at Trinity College, Cambridge. He became a member of the Statistical Society of London in 1866, in which capacity he wrote the following valuable contributions to economic statistics: *Railway Extension and its Results* (1866); *National Income of the United Kingdom* (1868); *Taxation of the United Kingdom* (1869); *National Debts of the Various States of the World* (1871); *Political Progress of the Working Classes* (1871).

**BAXTER,** SYLVESTER (1850–1927). An American publicist and writer. He was born in West Yarmouth, Mass., and received his academic education at Leipzig and Berlin (1875–77). Upon his return from abroad he took up newspaper work in Boston, subsequently serving as editor of the *Mexican Financier* (1883–84) and of the *Outing Magazine* (1885–86). He acted as special correspondent for several newspapers and magazines, in Mexico in 1883–84 and in South America in 1906. He first suggested the organization of Greater Boston and of a metropolitan park system for that city, and subsequently he became closely identified with the carrying out of these projects. In addition to numerous short stories, poems, and essays in magazines, his writings include: *The Old New World: Statement of the Hemenway Southwestern Archæological Expedition* (1888); *Berlin: A Study in Municipal Government* (1890); *Cruise of a Land Yacht* (1891); *Greater Boston* (1891); *Spanish Colonial Architecture in Mexico* (1902); *Quest of the Holy Grail* (1904); *Old Marblehead* (1906).

**BAXTERIANS.** The term formerly applied to those who adhered to Richard Baxter's theological system, the peculiar doctrines of which were: first, that though Christ died in a special sense for the elect, yet he also died in a general sense for all; second, the rejection of the dogma of reprobation; third, that it is possible even for saints to fall away from saving grace. Baxter's views tended toward a liberal theology, but they are deficient in logical development. Like those of the "New England Theology" (q.v.), they occupied middle ground between what were considered the hard conclusions of Calvinism and the latitudinarian views of Arminianism. The two most eminent Baxterians were Dr. Isaac Watts and Dr. Philip Doddridge.

**BAY** (origin obscure; cf. LL. *basia*, bay). A term properly applied to an indentation of the sea into the land, with an opening wider than the depth. A gulf is understood to be deeper than a bay and has often a narrow opening. These terms are often loosely applied; Baffin Bay, e.g., is really a gulf. When the body of water is large, and the entrance narrow, it becomes a shut sea, as the Baltic, the Red Sea, etc. Hudson's Bay, the Persian Gulf, and the Gulf of Mexico might with propriety be termed seas.

**BAY** (OF. and Fr. *baie*, berry, from Lat. *baca*, berry). A name given to a number of trees and shrubs more or less resembling the laurel or victor's laurel (*Laurus nobilis*), which is also called sweet bay (see LAUREL), the name "bay," which was once exclusively applied to the fruit, having been extended to the whole plant. The common laurel or cherry laurel (*Prunus laurocerasus*) is sometimes called bay laurel. (See LAUREL.) The red bay of the Southern States of America is *Persea carolinensis*. The white bay, of sweet bay of America, is *Magnolia glauca* (see MAGNOLIA), and the loblolly bay of the same country is *Gordonia lasianthus*. (See GORDONIA.) The California bay tree is *Umbellularia californica*. Rosebay is a name sometimes applied to some of the evergreen rhododendrons. From early times bay leaves have been associated with popular superstitions and usages. Along with other evergreens, they have adorned houses and churches at Christmas; and in token of rejoicing or of some meritorious deed, sprigs of bay, as well as of laurel, have been worn in the hat or wreathed around the head. The leaves of some kinds of bay are employed for flavoring various articles of food.

**BAY** (OF. *bayer*, to gape, from ML. *badare*, to gape). In architecture, one division or unit in a structure, from top to bottom, including a main opening. In the interior of a Gothic church, for instance, a bay is a single pier arch of the nave or choir, with the corresponding part of triforium and clerestory above it; a section of the church bounded by two imaginary vertical lines from roof to pavement, passing through the centres of the supporting piers. A church has as many bays as it has pier arches. So in secular architecture, the voids being generally repeated over voids and solids over solids, a bay is a slice of the exterior (or interior) from top to bottom, from the centre of one solid to the centre of the next, taking in one window or opening in each story. A façade has as many

bays as there are of these vertical slices or repeats from end to end of the building.

**BAYA, SPARROW.** bä'yȧ (native name), or An East Indian weaver bird (*Ploceus baya* or *philippina*), remarkable for its tubular hanging nest. In India and Malaya this bird is familiar about village houses, is often kept in confinement or even as a free pet, and is trained to do a variety of tricks and especially to find small articles, steal ornaments from the hair, carry notes to certain places, etc. See WEAVER BIRD.

**BAYAD,** bȧ-yȧd'. A large edible catfish (*Bagrus bayad*) of the Nile.

**BAYADÈRE,** bä'yȧ-dēr', or **BAYADEER** (from the Port. *bailadeira*, through the Fr. *bayadère*, danseuse, dancing girl; cf. It. *ballettare*, to dance, Eng. *ballet*). A name frequently used by Europeans to denote the dancing girls and singers of India. The title is especially applied to the women connected with the temples of southern India as opposed to the Nautch girls of northern India. As ministrants at the temples the Indian dancing women correspond in general to the ἱερόδουλοι, or *hierodūli*, the girls in attendance upon the shine of Aphrodite or Venus, at Corinth, in ancient Greece. In southern India these dancing girls are known as *Deva-dāsīs*, servants or slaves of the gods, and their office is to minister to the particular divinity to whom the temple may be sacred; to serve him and his priests at sacred festivals and solemn processions; to celebrate his glories and to weave the wreaths with which his image is decorated; to dance and sing twice a day before his idol at the shrine; and generally to perform subordinate duties in the temple, without participating in the celebration of certain of the most sacred rites, and to serve the priests in various ways. Although these dancing women are the servants of the gods, the public is said to call them by the more vulgar name of courtesans or prostitutes, whether they be for the enjoyment of the idols, or the Brahmans, or the benefactors of the sanctuaries. Hence, no doubt, comes the bad association connected with the designation "woman of the bayadere stripe." The ranks of the better class of these female ministrants at the temple are recruited, it is said, from the Vaiśya, or merchant caste; the inferior class from the families of Sudras, or working people. No strong social prejudice, however, is felt against their calling. A small but fixed salary is paid to them for their services in connection with the temple, and this stipend they supplement, it is understood, in various ways peculiar to their person and their profession. The higher class of bayaderes are often called in to perform at banquets, marriages, or at entertainments of the rich or the noble. Dancing in India is still confined to these professional girls, and is not considered respectable, although with the advance of female education women are now more generally taught to sing as well as to read. The special patroness or protectress of the Deva-dāsīs is the goddess Rambhā, who belongs to the band of Apsarases, or heavenly nymphs, of Indra's paradise. Consult Dubois, *Hindu Manners, Customs, and Ceremonies* (Oxford, 1897). See NAUTCH.

**BAYAMO,** bȧ-yä'mō. An inland town in the province of Oriente, Cuba, 60 miles northwest of the city of Santiago (Map: Cuba, J 6). It is situated in a plain on the Rio Bayamo, an affluent of the Cauto, and is an agricultural and commercial centre, though formerly its importance was much greater. One of the oldest cities on the island, Bayamo, was founded in 1514 by Velasquez. It was prominent in the Republican uprising of 1868, and was one of the strongholds of the insurgents. Pop., 1899, 3022; 1907, 4102.

**BAYAMON,** bä'yȧ-mōn'. A town of Porto Rico, 6 miles (direct) southwest of San Juan (Map: Porto Rico, E 2). It is on the American Railroad and is an industrial centre, having sugar mills, match and tobacco factories, manufactories of ice and bricks, an iron foundry, and an oil refinery. The region abounds in grazing land, and sugar cane and fruit are grown. The town is well built and has a public school, a college, and several churches. Pop., 1899, town, 2218; municipality, 19,940; 1910, town, 5272; municipality, 29,986. Within the district of Bayamon are the ruins of Pueblo Viejo, the oldest Spanish settlement on the island. They are the remains of Caparra, a town reputed to have been founded in 1509 by Ponce de Leon.

**BAYARD,** bā'ērd, *Fr. pron.* bȧ'yär'. The horse of the four sons of Aymon, famous for his swiftness and for his power of adjusting the length of his body to one or several riders. He appears in *Orlando Innamorato*, *Orlando Furioso*, and Tasso's *Rinaldo*. On St. John's Eve, according to the legend, the clatter of his hoofs may still be heard over the hills of the Ardennes. The name "Bayard" is used to designate any spirited or fine horse.

**BAYARD,** bī'ērd, GEORGE DASHIELL (1835–62). An American soldier, born at Seneca Falls, N. Y. He graduated at West Point in 1856 and passed four years in garrison duty on the frontier. At the outbreak of the Civil War he was appointed colonel of the First Pennsylvania Cavalry Volunteers. He was soon promoted to be brigadier general, served in the campaigns of the Shenandoah and the Rappahannock, and was mortally wounded at Fredericksburg (Dec. 13, 1862).

**BAYARD,** JAMES ASHETON (1767–1815). An American statesman, born in Philadelphia, Pa. He graduated in 1784 at Princeton, began the practice of law in Delaware, and in 1796 was elected to the national House of Representatives, where he achieved a high reputation as an orator and a leader of the Federalists. When, after the indecisive presidential contest of 1800 between Jefferson and Burr, the duty of election devolved upon the House, Bayard was prominent in securing the choice of the former. From 1805 to 1813 he was a United States Senator. In 1814 he was a member of the commission which negotiated with Great Britain the Treaty of Ghent.

**BAYARD,** JAMES ASHETON (1799–1880). A distinguished American constitutional lawyer and statesman, son of James Asheton Bayard and father of Thomas F. Bayard (q.v.). He was born in Wilmington, Del., studied law, and attained considerable eminence at the bar. He served in the United States Senate as a Democrat during the years 1851–64 and 1867–69, for a considerable part of which time he was chairman of the judiciary committee.

**BAYARD,** bȧ'yär', JEAN FRANÇOIS ALFRED (1796–1853). A French dramatist. He was born at Charolles, Saône-et-Loire, and studied law, but in 1828 turned to dramatic composition. In collaboration with Scribe and others he wrote more than 200 plays, including *La perle des*

*maris* and *Le yamin de Paris*. His collected works appeared in 12 vols. (1855–59).

**BAYARD**, bī'ērd, JOHN (1738–1807). An American patriot, born at Bohemia Manor, Md. He became a prominent merchant of Philadelphia, was a member of the provincial congresses of 1774 and 1775; in 1776 was appointed by the Constitutional Convention a member of the Council of Safety, and in 1776–77 served in the American army as colonel of infantry. He was Speaker of the Pennsylvania House of Assembly in 1777 and 1778, and was elected in 1785 to the Continental Congress. During the Revolution he assisted in furnishing arms to Congress and in fitting out a privateer.

**BAYARD**, bä'yär', PIERRE DU TERRAIL (1476–1524). A French knight, the *chevalier sans peur et sans reproche*, without a rival the model of chivalric virtue, and one of the few mediæval knights whose virtues can stand the tests of modern culture. Though his activity was chiefly military, he cultivated all the gentler virtues, yet was equaled by none in courage and intrepidity. Three French kings profited by his loyal devotion—Charles VIII, Louis XII, and Francis I. Italians, Spaniards, and Englishmen on innumerable occasions suffered by his remarkable exploits, but they honored as much as they feared him. At the Garigliano (1503) Bayard defended the bridge alone, against a whole detachment of the victorious army of Gonsalvo de Cordova. At Guinegate, in the "Battle of the Spurs" (1513) he performed an equal feat of valor. At Marignano (1515) Bayard gained a brilliant victory over the Swiss auxiliaries of the Duke of Milan. Upon the battlefield, his elated King (Francis I) bowed to receive knighthood from the hero of this "Battle of the Giants." In 1521 Bayard defended Mézières against Charles V, prevented an invasion which France could hardly have resisted, and on his return to Paris was hailed as the savior of his country. He was given command, in his own name, of a company of 100 knights—an honor usually accorded only to princes of the royal blood. He fell in the battle of the Sesia, April 30, 1524. While dying he fell into the hands of the Spaniards, among whom was the Constable of Bourbon, his last utterance to whom has become famous: "My lord, I thank you; but pity is not for me, who die a true man, serving my King; pity is for you, who bear arms against your prince, your country, and your oath." The Spanish vied with the French in the honors paid to his remains and his memory. His life was written soon after by Symphorien Champier, his "loyal servant." Consult St. Alban, Berville, and others, *Le Chevalier Bayard*, trans. and ed. by E. Walford (London, 1867).

**BAYARD**, bī'ērd, THOMAS FRANCIS (1828–98). An American statesman and diplomatist. He was born on Oct. 9, 1828, in Wilmington, Del., attended a private school in Flushing, L. I., and for some time was a clerk in a New York commercial house, but returned to Wilmington (1848), studied law with his father (J. A. Bayard), and was admitted to the bar in 1851. In 1861 both he and his father, though strongly opposed to secession, were also opposed to coercion, and publicly denounced the war, in which neither took any part. In 1869 he succeeded his father as United States Senator, being the fifth member of the family to represent Delaware in this capacity, and served continuously until 1885, when he became Secretary of State under President Cleveland. In the Senate he took a leading position on the Democratic side; he was a member of the Electoral Commission in 1877, and was President pro tem. of the Senate in 1881. His name was often urged for the presidency, and in the Democratic national conventions of 1880 and 1884 he was the chief rival of the successful candidates. As Secretary of State he was called upon to deal with several important matters, such as the Bering Sea controversy and the British and Russian treaties. From 1893 to 1897 he was United States Ambassador to Great Britain, being the first to hold that diplomatic rank. While holding this office he was considered by some to have become too partial to English ways. For uttering some criticisms regarded as unfavorable to the United States the House of Representatives passed a vote of censure on him on Nov. 7, 1895. He received the degree of LL.D. from Harvard, and honorary degrees from both Oxford and Cambridge. Consult Edward Spencer, *Public Life and Services of Thomas F. Bayard* (New York, 1880).

**BAYAZID**, bä'yä-zēd', I. See BAJAZET.

**BAYBAY**, bī'bī'. A town of Leyte, Philippines, 40 miles from Tacloban, the capital of the province (Map: Philippine Islands, E 5). The town is a centre for coast trade and an important hemp port. Pop., 1903, 22,990.

**BAY'BER'RY.** See CANDLEBERRY.

**BAY CITY.** A city and the county-seat of Bay Co., Mich., 108 miles north of Detroit on the Saginaw River, at the head of navigation, and on the Michigan Central, the Pere Marquette, the Detroit and Mackinac, the Detroit, Bay City, and Western, and the Grand Trunk railroads (Map: Michigan, F 5). It is connected also by boat with other lake ports. Several bridges cross the river at this place, and the city contains parks, two public libraries, a handsome Masonic Temple, a State Armory, and fine city hall. There is a large trade in lumber, salt, beet sugar, chicory, alcohol, coal, machinery, etc. Industries include shipbuilding and the manufacture of railroad wrecking cranes, etc. The distilling and fishing interests are also important. Settled in 1836, Bay City was incorporated as a village in 1859, and in 1865 was chartered as a city. In 1905 Bay City and West Bay City were consolidated. The water works and electric light plant are owned by the municipality. Pop., 1910, 45,166; 1920, 47,554.

**BAY CITY.** A town and the county-seat of Matagorda Co., Tex., about 25 miles from the Gulf of Mexico, 86 miles southwest of Houston, on the Colorado River, near the Intercoastal Canal; and on the Gulf, Colorado, and Santa Fe, the St. Louis, Brownsville, and Mexico, and the Galveston, Harrisburg, and San Antonio railroads (Map: Texas, E 5). The chief industries are cotton ginning, rice milling, and the manufacture of ice and dairy products. The city is in a rich agricultural region, producing cotton, corn, rice, sugar cane, and a great variety of fruit. Bay City was founded about 1895, at which time it was made the county-seat. Its growth has been rapid. Pop., 1900, 473; 1910, 3156.

**BAYER**, bī'ēr, JOHANN (1572–1660). A German astronomer. He was a zealous Protestant pastor and obtained the cognomen *Os Protestan-*

*tium* ('the Mouth of Protestants'). He is now remembered chiefly for his *Uranometria* (1603), in which he gave 51 maps of the heavens, constructed from the observations of his predecessors, and followed by explanations in his *Explicatio Caracterum Æneis Tabulis Insculptorum* (1654). In the former work he outlined 60 constellations, including, in addition to the 48 ancient constellations known to Ptolemy, 12 situated in the Southern Hemisphere and due chiefly to Petrus Theodorus of Embden, who died in 1596. He introduced in his maps the plan of distinguishing the stars of a constellation by means of Greek and Latin characters designating the largest star of the constellation by the first letter of the alphabet, and the rest in order of their apparent brilliancy by the succeeding letters.

**BAYER,** KARL ROBERT EMMERICH VON (1835–1902). An Austrian novelist, whose pseudonym was Robert Byr; born at Bregenz and educated at the military academy of Wiener-Neustadt. He served as an officer of the General Staff in the Italian campaign in 1859, but resigned from the military service in 1862 and thenceforth devoted himself exclusively to the writing of fiction, especially novels of military life. Among his best productions are the following: *Der Kampf ums Dasein* (5 vols., 1869; 2d ed., 1872); *Gita* (4 vols., 1877); *Eine geheime Depesche* (1880); *Unversohnlich* (1882); *Lydia* (1885); *Der Weg zum Glück* (1890); *Sternschnuppen* (1897).

**BAYES,** bāz. A caricature of Dryden in Buckingham's play, *The Rehearsal.* The character is a would-be literary man and was at first meant to satirize Sir Robert Howard. The drama abounds in ridiculous situations, and the laureate's mannerisms are excellently shown.

**BAYEUX,** bā'yē' (city of the Baiocasses; *Baioca* in the Middle Ages). An episcopal city of France, in the department of Calvados, Normandy. It stands in the fertile valley of the Aure, about 5 miles above its outlet in the English Channel (Map: France, N., E 3). This ancient, badly built town has a fine cathedral; its splendid portal and three towers are conspicuous features of the place. The public institutions are a seminary, a communal college, a library of 30,000 volumes, and a museum, whose most curious historic relic is the famous tapestry by Matilda, Queen of William the Conquerer, which depicts the invasion of England. The industries of Bayeux comprise the manufacture of porcelain, lace, leather goods, and cotton. There is a brisk trade in farm products. Pop., 1901, 7312; 1906, 7736; 1911, 7638. Bayeux occupies the site of that Roman Augustodurum which took the place of the ancient capital of the Gallis Baiocasses. The position exposed to all the storms which swept over France from the conquest of Rollo to the great Revolution, during which it remained loyal to the Bourbons. Consult: Masselin, *Le diocèse de Bayeux du Ier au XIe siècle* (Caen, 1898), and Hepworth, "Bayeux," in *The Artist,* No. xxii (New York, 1898).

**BAYEUX TAPESTRY.** The most remarkable and extensive remaining specimen of early mediæval embroidery (q.v.). It is a web of white canvas or linen cloth, 214 feet long by 20 inches wide, preserved in the public library at Bayeux, France (Normandy). Upon it is embroidered, in woolen thread of various colors, a representation of the invasion and conquest of England by the Normans in 1066. Tradition asserts it to be the work of Matilda, wife of William the Conquerer; but it was made for Odo, Bishop of Bayeux, for his cathedral, where it was used as a decorative hanging on feast days. It contains 1512 figures in 72 subjects, with Latin inscriptions giving the subjects and names. The heads and hands of the figures are crudely designed in "plumetis"; the rest is formed of parallel lines of woolen threads fastened down at intervals. A thread of a different shade gives the outlines. The border is of foliage, fantastic animals, and hunting scenes. The tapestry is most valuable for a representation of the costume, arms, and manners of the Normans before the Conquest, and does for this period what the columns of Trajan and Marcus Aurelius do for Roman military life in their age; giving also, as they do, more details of the events represented than are given in contemporary literature. It is, in fact, more than a history of the Conquest; for it gives the life of Harold, even during the lifetime of Edward the Confessor, the incidents of his journey to Normandy, his return and coronation, the Norman expedition, the battle of Hastings, and Harold's death. Reproductions in autotype have been edited by Fowke (London, 1875), and in color by Stothard, *Vetusta Monumenta,* vol. vi, part i. Consult Freeman, *History of the Norman Conquest* (London, 1875), vol. iv. Consult also the monographs by Fowke (ib., 1898) and Marignan (Paris, 1892).

**BAYEZID.** See BAJAZET.

**BAY LAU'REL.** See CHERRY LAUREL.

**BAYLE,** bĕl, PIERRE (1647–1706). A French philosopher and critic. He was the author of a famous *Historical and Critical Dictionary* (*Dictionnaire historique et critique*), which passed through eight editions in 40 years (1697, 1702, 1715, 1720, 1730, 1734, 1738, 1740), and was twice translated into English (1710, 1734–37). He was born at Carla, near Foix, Nov. 18, 1647, of a Protestant family, studied at Puy-Laurens and Toulouse, and showed the critical balance of his mind by professing Catholicism in 1669 and Protestantism in 1670. He taught for a time in Geneva and in 1675 became professor of philosophy at the Protestant Academy of Sedan. On its suppression (1681) Bayle sought intellectual freedom in Holland and settled at Rotterdam, where he received a salary from the municipality as an unattached professor of philosophy. He now published his first important work, the sensational *Pensées sur la comète,* and a *Critique générale sur l'histoire du Calvinisme du Père Maimbourg* (1682), somewhat antiquated in style, but in thought a full generation in advance of his countrymen. In 1684 he began to publish a literary magazine, *Nouvelles de la république des lettres,* and greeted the revocation of the Edict of Nantes in two pamphlets, *Ce que c'est que la France toute catholique sous le règne de Louis le Grand,* and a *Commentaire philosophique sur le Compelle Intrare* (1686), which were denounced for "preaching the dogma of religious indifference and universal toleration," alike by Protestants and by Catholics, and were disavowed ironically by Bayle, who had the courage of his convictions but not of their consequences. Such tactics, afterward imitated by Voltaire, make his authorship

of *Avis aux réfugiés* (1690) dubious, but in any case it intensified the opposition of Protestants, who now accused him of atheism, with the result that Bayle was deprived (1693) of his municipal pension and authority to teach in Rotterdam. This act he chose to attribute to his Cartesian philosophy, the ministers being, he said, "obstinate admirers of Aristotle."

Bayle now devoted himself wholly to compiling his Dictionary, originally as a work of pure erudition, to trace and rectify error in other works, though it became in the course of its compilation a destructive criticism of received history and systems, and so an arsenal of rationalism for the eighteenth century. The Dictionary makes no pretense to completeness, but it acquires a kind of unity through its constant insinuation that the teachings of reason contradict the dogmas of religion, and that the rational man, in forming his morality, will consider only himself. In the articles of the Dictionary, and still more in the notes to them, Bayle's humor delights in daring impieties and Rabelaisian obscenities, after the manner of his time. It popularized his work, but gave a handle to his enemies, who grew in number and virulence. To justify himself, he wrote four dissertations—*On Atheists; On Manichæans; On Obscenities;* and *On Pyrrhonists;* but his last work—*Réponse aux questions d'un provincial* (1703) and *Continuation des pensées sur la comète* (1704)—showed that he still thought it, in his own words, "in no wise sure that the impressions of nature are to be accepted as the expressions of truth." He died at Rotterdam, Dec. 28, 1706. Bayle's private life was dignified and disinterested. His libertinism was wholly intellectual. His ideas and spirit penetrate like yeast the whole eighteenth century. Bayle's *Works* (4 folios, 1727–31, reprinted with additions, 1737) contains his interesting *Correspondence.* There is an annotated edition of the *Dictionnaire* in 16 vols. (Paris, 1820), and a *Selection of Unpublished Correspondence* (*Choix de la correspondance inédite*, Copenhagen, 1890). Consult Desmaizeaux, *La vie de Pierre Bayle* (The Hague, 1732), Feuerbach, *Pierre Bayle* (Leipzig, 1848), and also Brunetière, *Etudes critiques* (5th series, 1893); Renouvier, *Philosophie analytique de l'histoire,* vol. iii (1897); Perrens, *Les libertins en France au XVIIe siècle* (1896); and A. Cazes, *Pierre Bayle: sa vie, ses idées, son influence, son œuvre* (Paris, 1905).

**BAYLEN,** bī-lān'. See BAILÉN.

**BAYLEY,** bā'lī, JAMES ROOSEVELT (1814–77). An American prelate of the Roman Catholic church. He was born in New York, graduated at Washington (now Trinity) College, Hartford, was ordained a Protestant Episcopal clergyman, and for some time preached in New York. In 1842 he became a Roman Catholic, and two years later was ordained by Bishop Hughes. He served for a time as professor of belles-lettres and acting president of St. John's College, Fordham, N. Y., and was secretary to Bishop Hughes from 1846 to 1853, when he was consecrated Bishop of Newark, N. J. He founded Seton Hall College and many other institutions. In 1872 he was made Archbishop of Baltimore. He published a *History of the Roman Catholic Church on the Island of New York* (1853), *Pastorals for the People,* and the *Memoirs of Simon Gabriel Brute, First Bishop of Vincennes* (1860). He was much esteemed for his social as well as for his intellectual gifts.

**BAYLEY,** RICHARD (1745–1801). An American physician. He was born in Fairfield, Conn., studied in London hospitals, began to practice in New York in 1772, and in 1775–76 studied in England with Dr. John Hunter. Early in 1776 he returned to the United States as staff surgeon to Sir Guy Carleton. He lectured on surgery and published a work on croup, introducing a new and valuable method of treating that disease. In 1792 he became professor of anatomy and surgery in Columbia College. He was the first health officer of the port of New York and as such originated New York's quarantine laws.

**BAYLEY,** WILLIAM SHIRLEY (1861– ). An American geologist, born in Baltimore, Md. He graduated from Johns Hopkins in 1883, was a fellow at that university for two years, and received the degree of Ph.D. in 1886. His earlier service was at Colby College, as professor of geology (1888–1904); his later, at the University of Illinois, first as assistant professor of geology (1907–09), and then as associate professor of mineralogy and economic geology (1909– ). After acting for 21 years as assistant geologist in the United States Geological Survey he was made geologist in 1908. Several American and European scientific societies elected him to membership. Besides editing *The American Naturalist* (1886–1907), he contributed frequently to technical journals, prepared many geological reports, and wrote *Iron Mines and Mining in New Jersey* (1912).

**BAYLISS,** SIR WYKE (1835–1906). An English painter and writer on art. He was born at Madeley, and studied in the schools of the Royal Academy. He is known as one of the most prominent advocates of the Neo-Gothic revival; but his interesting pictures, which usually treat of church interiors, are of no great technical merit. They have often been exhibited in America. The best include "La Sainte Chapelle" (Royal Academy, 1865); "St. Mark's, Venice" (Nottingham, 1880); "St. Peter's, Rome" (1888); "The Golden Duomo" (Pisa, 1892). He succeeded Whistler as president of the Royal Society of British Artists in 1888. He wrote: *The Witness of Art* (1876); *The Higher Life in Art* (1879); *The Elements of Aërial Perspective* (1885); *Rex Regum: A Painter's Study of the Likeness of Christ* (1898); *Five Great Painters of the Victorian Era* (1902); *Seven Angels of the Renaissance* (1905).

**BAYLOR,** FRANCES COURTENAY (1848– ). An American novelist, born at Fayetteville, Ark. In 1896 she married George S. Barnum. She first attracted attention by two short stories, *The Perfect Treasure* and *On This Side,* published together under the title *On Both Sides* (1886). Among her other novels are: *Claudia Hyde* (1894); *Nina Barrow* (1897); *The Ladder of Fortune* (1899); *A Georgian Bungalow* (1900). *Juan and Juanita* (1897) is a book for juvenile readers.

**BAYLOR,** ROBERT EMMET BLEDSOE (1793–1874). An American jurist, born in Lincoln Co., Ky. After serving in the War of 1812 he began the practice of law in Kentucky, but afterward removed to Alabama; was a member of Congress from that State from 1829 to 1831, and participated in the Creek War as commander of a volunteer regiment. He afterward removed to Texas, where he became one of the foremost advocates of the annexation of that republic to the United States, and was a member of the First Constitutional Convention. He

subsequently served as a district judge for 25 years. A Baptist college, chartered in 1845 by the Congress of Texas, received the name of Baylor University, in recognition of the liberal donation bestowed upon it by Judge Baylor.

**BAYLOR UNIVERSITY.** A Baptist educational institution. It was chartered in 1845 by the then Republic of Texas and was formerly situated at Independence, Tex., but removed to Waco in 1886. Its productive funds in 1913 amounted to $200,000, with $300,000 in notes in process of payment. Its library had 26,300 bound volumes. The faculty of the academy, college, and schools of fine arts, medicine, and pharmacy numbered 76, and the students of all departments 1531. President, S. P. Brooks.

**BAYLY,** bā'lī, ADA ELLEN. See LYALL, EDNA.

**BAYLY,** LEWIS (–?1631). Bishop of Bangor, Wales. He was a native Welshman; was educated at Oxford, and enjoyed favor at court, but later lost it because of his puritan sympathies. He is now remembered only as the author of the *Practice of Piety*, the most popular religious book until Bunyan's work appeared. Bunyan attributed his first religious awakening to the reading of this book. Besides numerous editions of the original work, translations appeared in Welsh, French, German, Polish, and Romansch. John Eliot translated it into the Indian language as an aid in his mission work.

**BAYLY,** THOMAS HAYNES (1797–1839). An English poet. He was intended for holy orders and educated at Oxford. He inherited a large fortune, but lost it, and in 1831 began to write songs for music and, with Henry Bishop, published *Melodies of Various Nations*. Within a few years he wrote 36 dramatic pieces, a number of stories, and hundreds of songs. Some of the more popular were: "The Soldier's Tear"; "Why Don't the Men Propose?" "We met, 'Twas in a Crowd"; "I'd Be a Butterfly," etc. His best farce is *Perfection*. His fiction is represented by *The Aylmers*, a novel in 3 vols., and *Kindness in Women*, a collection of tales. Consult his *Works*, with memoir (London, 1844).

**BAYNE,** bān, PETER (1830–96). A Scottish author. He was educated in Marischal College, Aberdeen; studied theology at Edinburgh and philosophy under Sir William Hamilton. He wrote criticisms on Alison, De Quincey, Hugh Miller, and others. In 1855 he published *The Christian Life, Social and Individual*, which was follow in 1859 by *Essays, Bibliographical, Critical*, etc. He was editor of the Glasgow *Commonwealth*, Edinburgh *Witness*, and London *Dial*, and an associate editor of the *Christian World*. Among his other works are: *Testimony of Christ to Christianity* (1862); *The Days of Jezebel: An Historical Drama* (1872); *Life of Luther* (1887). He died in London, Feb. 10, 1896.

**BAYNES,** bānz, THOMAS SPENCER (1823–87). An English writer on philosophy. He was born at Wellington, Somerset; was educated at Bristol College and Edinburgh University and became assistant to Sir William Hamilton at the latter institution. He published an *Essay on the New Analytic of Logical Forms* (1852), an exposition of Hamilton's *Quantification of the Predicate*. From 1857 to 1863 he was one of the examiners for the University of London and assistant editor of the *Daily News*. In 1864 he became professor of logic, rhetoric, and metaphysics in the University of St. Andrews, where he remained till his death. He wrote much for the *Edinburgh* and other reviews and magazines, and was editor of the ninth edition of the *Encyclopædia Britannica*.

**BAY OF ISLANDS.** 1. A bay on the northeast coast of North Island, New Zealand, in lat. 35° 14′ S., long. 174° 11′ E. (Map: New Zealand, N. I., B 1). 2. A bay on the west coast of Newfoundland, studded with many beautiful islands, with fisheries, timber, and deposits of marble and gypsum (Map: Newfoundland, B 3).

**BAY OF NAPLES.** See NAPLES, BAY OF.

**BAYOMBONG,** bä'yôm-bông'. The capital of the province of Nueva Vizcaya, on the island of Luzon, Philippines (Map: Philippine Islands, C 2). The town is situated on the Magat River, 134 miles north of Manila, and is the centre of a fertile district, producing rice and tobacco. Pop., 1903, 4039.

**BAY'ONET** (Fr. *baionnette, bayonnette*, first made in Bayonne, France). A short dagger-like weapon of steel, constructed so that it may be fixed at the end of the rifle barrel, to which it is attached by a strong spring clasp, usually secured to the block of the foresight. When not so fixed, it is carried in a leather scabbard suspended from the waist belt on the left side of the body. The first bayonets, used in France in 1671, were known as *bayonets-à-manche* and had handles which fitted into the muzzles of the guns; the socket bayonets, or *bayonets-à-douille*, not being introduced until a later date. These latter permitted the piece to be fired without removing the bayonet. The dagger is said to have been the original bayonet; the musketeer of that day having utilized his dagger as a defense against charging cavalry by fitting the handle of his dagger into the muzzle of his musket. During the gradual evolution of the modern sword bayonet, which is now a weapon of offense rather than of defense, many experiments have been made in the attempt to introduce various forms of intrenching tools—knives, etc., constructed to serve also as bayonet; but such arrangements are nowhere in general use. Many authorities maintain that the bayonet, together with all other forms of the *arme blanche*, have become of very little, if comparatively any, importance in modern operations; while others, equally as positive, assert that it still retains decisive value. It is certainly true that long-range and rapid-fire rifles, together with smokeless powder, often seal the fate of a battle long before the bayonet can be brought into play; but there are still campaigns where the soldier armed with a bayonet has a considerable moral superiority over his opponents not so armed. The British-Egyptian campaigns of 1882–84 and 1886, the frontier expeditions in India, and the Boer War of 1899–1902 are cases in point. The best tactician in the world cannot always prevent, even with modern firearms, such things as surprises; and small bodies of men will still occasionally, under practically any conditions, be able to get unperceived into close quarters with their enemy. So long as night attacks are possible, just so long will the bayonet be of prime importance, for it is undoubtedly and invariably the weapon to be used. In every battle there are important positions which must be quickly taken by assault, and one of the principal lessons of the war in Manchuria is not to abandon the bayonet. See TACTICS, MILITARY: INFANTRY.

**BAYONNE,** bā-yōn', *Fr. pron.* bā'yôn' (Bay city, from Bisc. *baia, baiya*, harbor, Portug. *bahia*, Eng. *bay*). A cathedral town, and a for-

tress of the first class, in the department of the Basses-Pyrénées, France (Map: France, S., C 5). It stands 3½ miles from the Bay of Biscay, at the confluence of the Nive and Adour, which rivers divide the city into Great and Little Bayonne, with which the Faubourg Saint-Esprit is connected by a bridge. The city is cheerful and pleasant, and the valley in which it lies is backed by the foothills of the Pyrenees. The harbor of Bayonne is safe and commodious, and has three lighthouses at its entrance. The noteworthy institutions consist of a library, a theological seminary, a museum, a military hospital, barracks, and a naval school. The cathedral was begun in 1213, and its corbels bear the arms of English princes of the occupation period. The spires are modern (nineteenth century). Bayonne has an extensive trade with Spain, Portugal, and South America, and sends masts and ship timber to Brest and other French ports. Other exports include wine, tars and resins, minerals, grain, chocolate, and the famous Bayonne hams. Its industries comprise the making of brandy, cream of tartar, chocolate, leather, linen goods, and the refining of sugar. Glass works, anchor foundries, and shipyards are also in active operation at Bayonne. Pop., 1901, 32,722; 1906, 26,488; 1911, 27,886. Bayonne is the ancient Lapurdum, the capital of the Tarbelli, and as early as the third century A.D. was a fortress and a commercial centre. In the Middle Ages is was important because of its trade, its whaling fleet, and its manufacture of leather and arms. It has sustained several sieges, offering successful resistance to allied Spanish and British troops in 1814.

**BAYONNE,** bā-yōn′. A city in Hudson Co., N. J., on New York and Newark bays, and on the Central of New Jersey, and the Lehigh Valley railroads (Map: New Jersey, D 2). It contains the former villages of Centerville, Bergen Point, Bayonne, Constable Hook, and Salterville (Pamrapo), and is separated from Jersey City by the Morris Canal. The city has a large public library and is one of the most important manufacturing cities in the State. It contains large coal-shipping docks, chemical, boiler, refining and smelting works, motor boats, structural iron, insulated wire, and silk factories, and the largest plants of the American Radiator Company and of the Standard Oil Company, the refineries of which are connected by pipe lines with New York, Philadelphia, Baltimore, Pittsburgh, Baton Rouge, etc. The Hudson County Boulevard passes through the city. Bayonne was separated from Bergen as a township in 1861, was chartered as a city in 1869, and rechartered in 1872. It is governed by a mayor, elected biennially, who appoints the board of education, the board of health and library trustees, and, with the concurrence of the council, the police department and sinking-fund commissioners. Pop., 1900, 32,722; 1910, 55,545; 1920, 76,754.

**BAYONNE DECREE′.** A decree issued by Napoleon on April 17, 1808, under pretense of helping the United States to enforce the embargo of 1807, directing the seizure and sale of all vessels flying the American flag which should subsequently enter the ports of France, Spain, Italy, and the Hanse towns, on the ground that such vessels would either be sailing under false colors or would be violating the laws of the United States and indirectly serving the cause of England. In accordance with this decree it is estimated that France confiscated over 300 American vessels, which she sold for the benefit of her national treasury. See CONTINENTAL SYSTEM.

**BAYOU,** bī′o͞o (N. Am. Indian *bayuk*, like a canal). A stream not fed with springs, but running from one body of water to another. Tidal channels in the States on the Gulf of Mexico often bear this name.

**BAYOU STATE.** The name popularly given to the State of Mississippi, from the number of small creeks or bayous within its limits. See STATES, POPULAR NAMES OF.

**BAY PSALM BOOK.** The first book published in the American Colonies, the joint product of Richard Mather, founder of that distinguished family of New England divines, of Thomas Welde, and of John Eliot, the missionary to the Indians. It was printed by Stephen Daye, at Cambridge, in 1640, and after revision in 1647 remained in general use for many years. It is hard to realize how it can have ministered to edification, for it outdid Sternhold and Hopkins in harsh crudity of style, metre, and rhythm. Yet it was the product of university men. Mather had been a student at Oxford; John Eliot was a graduate of Cambridge. They must have served their apprenticeship there at Latin verse making, and it is incredible that they should not have been able to write better English verse. But they were determined that the Lord's praises should be sung according to His own will, and with their ideas of literal biblical inspiration they were willing to sacrifice every element of poetry to what they imagined was faithfulness to Hebrew originals. They tell us in their preface that they "attempted conciseness rather than elegance, fidelity rather than poetry." That they thought these qualities contradictory illustrates the fatal flaw in Puritan æsthetics. How numbing this moral discipline had been to the harmonies and amenities of life may be judged from the fact that few congregations knew more than five tunes, and but 10 are known to have been used in the first half-century of the *Bay Psalm Book's* existence. Consult Trent, *American Literature* (New York, 1903).

**BAYREUTH,** bī′roit, or **BAIREUTH** (Lat. *Baruthum*). The capital of the government district of Upper Franconia, Bavaria, formerly the capital of the principality of the same name, ruled by Margraves of the house of Hohenzollern (Map: German Empire, D 4). It is beautifully situated on the Red Main, 126 miles north of Munich. The streets are broad and well paved and its principal buildings are the Wagner Theatre; the old palace; the new palace, containing a gallery of paintings; the old opera house; a riding school; the infirmary; and the townhall. Among the interesting private houses are the Villa Wahnfried, the former residence of Richard Wagner, who is buried in its grounds, and the house of Jean Paul Richter. In the Central Cemetery are the graves of Jean Paul Richter and the composer Franz Liszt. Bayreuth has numerous educational and charitable institutions. There are manufactures of cotton and woolen goods, sewing machines, leather, earthenware, and agricultural and musical instruments. There are also breweries, distilleries, and brick kilns. Pop., 1900, 29,384; 1905, 31,861; 1910, 34,547. This town is popularly known as the mecca of the Wagnerites. In 1872, partly from funds collected from patrons and partly by the organization of so-called Wagner societies, there was begun the erection of a theatre for the production

of Wagner's works. It was opened in 1876, and since then music lovers have been attracted to Bayreuth from all over the world. The theatre occupies a site on a hill overlooking the town and is reached by a broad avenue of shade trees. In connection with the theatre is a school for the training of voices to participate in the Wagner festivals. Consult Meyer, *Das Stadtbuch von Baireuth* (München, 1896), and Jones, "Bayreuth and the Wagner Festival," in *Cassel's Magazine*, vol. xxvii (London, 1899); Bahr-Mildenburg and Bahr, *Bayreuth and the Wagner Theatre* (London, 1912).

**BAYREUTH MUSICAL FESTIVAL.** The Festival Theatre of Bayreuth has been described as the musical shrine of Richard Wagner. The building of the Festival Theatre had been the dream of Wagner's life, and eventually he was fortunate enough to secure the interest of the unhappy King Ludwig II of Bavaria, from whom and through whom he secured much financial assistance, which, with the subscriptions received from lovers of his music, enabled him to carry out his long-cherished scheme. The idea was first conceived in 1858, and the *Tetralogy of the Nibelungen* written, composed, and reserved until there should have been materialized the conditions and environments which its creator deemed necessary for its proper presentation. The situation of the theatre has been admirably chosen, with the town of Bayreuth in the foreground and the hills of Franconia for a background. Performances begin at 4 P.M. except when the *Rheingold* is given, when the hour is altered to 5 P.M. The artists, who invariably give their services, carry out as far as possible Wagner's directions and ideas. They never recognize the plaudits of the audience, and as far as possible discourage ebullitions of feeling on the part of their auditors. Originally the audience remained silent throughout every performance; but this rule is now seldom obeyed except in the solitary instance of *Parsifal*. In order to secure every possible artistic reinforcement, the orchestra is hidden away out of sight under the stage; and the auditorium itself is plunged into darkness before and after each act. On May 22, 1872, the foundation stone was laid, the event being marked by the performance of Beethoven's *Ninth Symphony*, with an orchestra of 500 instruments, comprising many of the greatest instrumentalists of the day, among whom were Wilhelmj (q.v.), playing a first-violin part, and Hans Richter, with the tympani. The theatre was opened in 1876 with *Der Ring des Nibelungen*, the festival continuing from August 13 to August 17. The next festival occurred in 1882, when *Parsifal* had its first presentation; since which event performances have been given almost every year. The festival of 1897 was especially remarkable as being the first time five complete works were given, the *Tetralogy* and *Parsifal*. To Frau Wagner and Siegfried Wagner, wife and son of the master, is mainly due the credit of maintaining intact, as far as possible, the traditions of the Bayreuth Festival. See MUSIC FESTIVAL.

**BAYRHOFFER,** bīr'hŏf'fĕr, KARL THEODOR (1812–88). A German-American philosopher and publicist, from 1838 to 1846 professor of philosophy in the University of Marburg. He became a member of the Diet of Hesse-Cassel in 1848, and in 1850 was President of the Chamber. After the defeat of his party (the Democratic) he came to America in 1853 and settled in Wisconsin as a farmer, though from 1866 he lived principally by his pen. In his early writings, notably in *Idea and History of Philosophy* (1838), he appears as a zealous disciple of Hegel. Afterward he became a champion of German Catholicism and wrote *Researches into the Essence, History, and Criticism of Religion* (1849).

**BAY RUM.** An aromatic liquid prepared by mixing oil of bay with alcohol and water and adding small quantities of oil of orange peel and oil of pimenta. Oil of bay is obtained by distilling the leaves of the *Myrcia acris*, a West Indian tree belonging to the natural order Myrtaceæ.

**BAY SAINT LOU'IS,** *Fr. Creole pron.* bā sān lōō'ē'. A city and the county-seat of Hancock Co., Miss., 53 miles by rail east by north of New Orleans, La.; on Mississippi Sound, the Jordan River, and on the Louisville and Nashville Railroad (Map: Mississippi, G 10). It is a popular watering place, a notable attraction being a fine shell road along the beach. The city contains St. Stanislaus College and the St. Joseph Convent. Its leading industries are fishing, oyster cultivation, and canning, fruit growing, and truck gardening. Pop., 1890, 1974; 1900, 2872; 1910, 3338.

**BAY SALT.** A name applied to common salt which is obtained from sea water by solar evaporation. Such salt is obtained from salt marshes which exist along the coast of France, on the shores of the Mediterranean, and in the West Indies. It is an inferior grade, useful for limited purposes.

**BAY STATE.** A popular name for the State of Massachusetts, given because previous to the adoption of the Federal Constitution it was called the Massachusetts Bay Colony. See STATES, POPULAR NAMES OF.

**BAY WIN'DOW,** or (corruptly) **BOW WINDOW.** A window first generally used in late civil Gothic architecture, so called because it forms a bay (q.v.) or projecting section of a room. Bay windows are, for the most part, either rectangular or polygonal in plan, the semicircular form from which the term *bow* was probably derived having been unknown before the latest form of Gothic. Bay windows generally reach to the floor, and are frequently supplied with a seat, which is called the "bay stall." There are many very beautiful examples in the colleges and halls of Oxford and Cambridge, as well as in the great feudal mansions. When used in upper stories and supported on corbels, such windows are called "Oriel windows" (q.v.).

**BAZA,** bä'thä (the *Basti* of the Romans). A town in Spain, situated near the river Baza, in the province of Granada, about 50 miles east-northeast of the city of that name (Map: Spain, D 4). It lies in a rich plain and is engaged in the production of wine, grain, fruit, oil, etc. There are manufactures of leather, fabrics, pottery, and sombreros, and flour and oil mills. Baza contains several fine churches, including the collegiate church of San Máximo. Pop., 1900, 12,770; 1910, 15,964. Under the Mohammedans Baza was a lively centre of trade and had 50,000 inhabitants. Isabella of Castile reduced the city after a seven-months siege in 1489. In 1810 the Spaniards were defeated here by the French under Marshal Soult.

**BAZA.** A wild negro people in upper Nubia; with neighboring tribes they are called Shangallas by the Abyssinians.

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